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CHEMISTRY

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TABLE OF CONTENTS

Sr. No.	Worksheet	Topics
		BOOK – I: A. PHYSICAL CHEMISTRY
1.	1	Fundamental Concepts
2.	2	States of Matter
3.	3	Atomic Structure
4.	4	Chemical Bonding
5.	5	Chemical Energetic
6.	6	Electrochemistry
7.	7	Chemical Equilibrium
8.	8	Reaction Kinetics
		BOOK – II: B. INORGANIC CHEMISTRY
9.	9	Periods and Groups
10.	10	Transition Elements
11.	11	Elements of Biological Importance
		BOOK – II: C. ORGANIC CHEMISTRY
12.	12	Fundamental Chemistry
13.	13	Hydrocarbons
14.	14	Alkyl Halides, Alcohols and Phenol
15.	15	Aldehydes and Ketones
16.	16	Carboxylic Acids and Amino Acids
17.	17	Macromolecules
18.	18	Environmental Chemistry

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Worksheet-1

(A. Physical Chemistry)

Fundamental Concepts

Q.1 Avogadro's number represents the number of:

A) Atoms in 1g of helium gas

B) Atoms in 24g of Mg

C) Molecules in 35.5g of chlorine gas

D) Electrons needed to deposit 24g Mg

Q.2 Which of the following terms is not used for ionic compounds?

A) Formula unit

B) Empirical formula

C) Molecular formula

D) Formula mass

Q.3 98g H_2SO_4 contains:

A) 4.0 moles of ions

B) 1 mole of ions

C) 2 moles of ions

D) 3.0 moles of ions

Q.4 Molecular ions are produced by:

A) Radio wave

B) α-rays

C) Beam of electrons

D) Both B and C

Q.5 Isotopes differ in:

A) Properties which depend upon mass

B) Arrangement of electrons in orbitals

C) Chemical properties

D) The extent to which they may be affected by electromagnetic field

Q.6 Which of the following mathematical relationship is correct for (m/e) in connection with mass spectrometer?

A) $m/e = \frac{H^2r^2}{2E}$

B) $\frac{H^2r^2}{E^2}$

C) $m/e = \frac{H^2r}{E}$

D) $\frac{H^2r}{2E}$

Q.7 Symbol not only indicates name of elements but also represents all of the following EXCEPT:

A) One atom of element

B) Number of parts by mass of an element

C) 1 gram atom of an element

D) 1 amu

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Q.8 **Which of the following is not mono isotopic element?**

A) F
B) Cl
C) Au
D) As

Q.9 **Which of the following statements is incorrect?**

A) Formation of uni-negative ion is exothermic

B) Number of positive ions having group of atoms is less than number of negative ions having group of atoms

C) X – rays and beam of electrons are used to produce positive ions

D) Number of cationic molecular ions is less than number of anionic molecular ions

Q.10 **What volume of oxygen is required for the complete combustion of $5cm^3$ C_2H_2?**

A) $12.5cm^3$
B) $13.0cm^3$
C) $13.5cm^3$
D) $14.0cm^3$

Q.11 **The relative atomic mass of boron, which consists of the isotopes $^{10}_{5}B$ and $^{11}_{5}B$ is 10.8amu. What is the percentage of $^{10}_{5}B$ atoms in the isotopic mixture?**

A) 0.8%
B) 20%
C) 8.0%
D) 80%

Q.12 **How many atoms of carbon are present in 34.2g of sucrose ($C_{12}H_{22}O_{11}$, Mr = 342)?**

A) 6.0×10^{22}
B) 3.6×10^{25}
C) 7.2×10^{23}
D) 3.6×10^{24}

Q.13 **What is the number of molecules in $1000cm^3$ of nitrogen under room conditions?**

A) 2.5×10^{22}
B) 3.5×10^{22}
C) 4.0×10^{23}
D) 4.5×10^{26}

Q.14 **Which is the correct sequence of stages in mass spectrometer?**

A) Ionization, amplification, recording, detection, separation

B) Ionization, amplification, detection, separation, recording

C) Recording, detection, amplification, separation, ionization

D) Ionization, separation, detection, amplification, recording

Q.15 **How many atoms are present in 49.0g of H_2SO_4?**

A) $7 \times 3 \times 10^{23}$
B) $7 \times 8 \times 10^{23}$
C) $5 \times 6 \times 10^{23}$
D) $6 \times 6 \times 10^{23}$

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Q.16 **An organic compound has empirical formula CH_2O. If molar mass of the compound is 90 grams, then molecular formula of this organic compound would be (A_r of C = 12, H = 1.008 and O = 16):**

A) $C_6H_6O_2$
C) $C_9H_9O_3$
B) C_3H_3O
D) $C_3H_6O_3$

Q.17 **How many Br atoms are in 3 moles of Br element?**

A) $3 \times 6.022 \times 10^{-23}$ atoms
C) $81 \times 3 \times 10^{23}$ atoms
B) $79 \times 3 \times 6 \times 10^{23}$ atoms
D) $3 \times 6.022 \times 10^{23}$ atoms

Q.18 **CO_2 produced during combustion analysis of given organic compound is absorbed in 50% of KOH solution. It is:**

A) Chemical change only
B) Physical change only
C) May be physical or chemical change
D) Neither physical nor chemical change

Q.19 **In the experimental determination of the percentages of carbon and hydrogen in an organic compound, water is absorbed by:**

A) KOH
C) K_2SO_4
B) $MgCl_2$
D) $Mg(ClO_4)_2$

Q.20 **12g of magnesium (Mg) reacts with dilute sulphuric acid (H_2SO_4) to produce H_2 gas. The amount of H_2 gas produced is:**

A) 4g
C) 2g
B) 3g
D) 1g

Q.21 **5.6g of KOH has been dissolved in $100cm^3$ of aqueous solution, the molarity of the solution is:**

A) 1.0M
C) 1.5M
B) 2.0M
D) 2.5M

Q.22 **Which of the following change with increase in temperature:**

I. Molality
III. Molarity
II. Mole Fraction
IV. %age composition (v/v)

A) I, II
C) III, IV
B) I, II, III
D) II, III

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Q.23 **Mark the incorrect statement about mole fraction:**

A) It is used for three components of a solution

B) It is independent of temperature

C) Its value is always less than 1

D) Sum of mole fraction is ≥1

Q.24 **Which of the following is the unit of molarity:**

A) $moldm^{-3}$ C) $molkg^{-1}$

B) gram equivalent L^{-1} D) $g\ cm^{-3}$

Q.25 **What is the %age by (v/v) of ethanol, if 5.0cm³ of ethanol is dissolved in 45.0cm³ of water:**

A) 10% C) 6%

B) 8% D) 4%

Q.26 **Silicon carbide (SiC) is an important ceramic material. It is produced by allowing and (SiO_2) to react with carbon at high temperature as shown in the reaction:**

$$SiO_2 + 3C \longrightarrow SiC + 2CO$$

When 0.3kg sand is reacted with excess of carbon, 0.1kg of SiC is produced. What is the percentage yield of SiC?

A) 35% C) 50%

B) 40% D) 45%

Q.27 **All of the following terms are correctly matched with the given data EXCEPT:**

Options	Terms	For which it is used	Example
A)	Relative atomic mass (A_r)	Element	H=1.008 amu
B)	Relative isotopic mass	Isotopes or elements	^{12}C, ^{13}C, ^{14}C
C)	Relative molecular mass (M_r)	Covalent compounds	H_2O=18.0 amu
D)	Relative formula mass	Ionic compound	KCl=74.5 amu

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Q.28 **All of the following terms are correctly matched w.r.t their definition EXCEPT:**

Options	Term	Definition
A)	Relative atomic mass	It is a mass of one atom of element as compared to mass of one atom of ^{12}C
B)	Relative formula mass	It is sum of relative atomic mass of atoms of one formula unit of ionic compounds
C)	Relative molecular mass	Is the sum of relative at mass of atom of one molecule of a covalent compound
D)	Mass number	It is sum of proton and neutrino

Q.29 **Identify the incorrect statement about percentage yield:**

A) Actual yield is less than theoretical yield

B) Percentage yield $= \frac{\text{actual yield}}{\text{theoritical yield}} \times 100$

C) Experimental error does not affect actual yield

D) Efficiency of a chemical reaction depends on amount of product

Q.30 **A solution contains three component A, B and C in the molar ratio 3 : 6 : 1. The percentage of mole fraction of component A is:**

A) 20%
C) 30%
B) 25%
D) 35%

Q.31 **Isotopes of an element have all of the following different properties EXCEPT**

A) They have different chemical properties
B) They have difference mass number
C) They have different number of neutrons
D) They have different half life

Q.32 **The combustion analysis of an organic compound shows 60% carbon, 8% hydrogen and 32% oxygen. If the molecular mass of the given organic compound is 200, then the molecular formula of the organic compound is (Ar of C = 12 amu, H = 1 amu and O = 16 amu):**

A) $C_{10}H_{16}O_4$
C) $C_{10}H_{14}O_4$
B) $C_8H_{16}O_4$
D) $C_5H_8O_2$

Q.33 **Ascorbic acid (vitamin C) contains 48% carbon, 4% hydrogen and 48% oxygen. Then which of the following is empirical formula of ascorbic acid:**

A) $C_2H_4O_3$
C) $C_2H_2O_3$
B) CH_2O
D) $C_4H_4O_3$

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ANSWER KEY (Worksheet-1)

1	B	11	B	21	A	31	A
2	C	12	C	22	C	32	A
3	D	13	A	23	D	33	D
4	D	14	D	24	A		
5	A	15	A	25	A		
6	A	16	D	26	C		
7	D	17	D	27	B		
8	B	18	A	28	D		
9	D	19	D	29	C		
10	A	20	D	30	C		

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Worksheet-2

(A. Physical Chemistry)

States of Matter

Q.1 When a sample of a gas is compressed at constant temperature from 15 atm to 60 atm, its volume changes from 76.0cm^3 to 20.5cm^3.

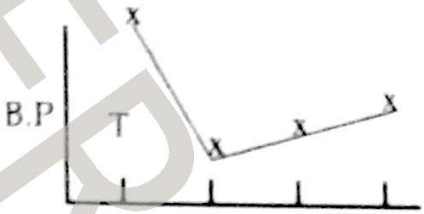
A) The gas behaves ideally

B) The gas behaves non-ideally

C) The volume of gas decrease

D) Gas is absorbed on the vessel walls

Q.2 The diagram shows the variation of the boiling points of hydrogen halides.



What explains the higher Boiling point of HF?

A) The bond energy of HF

B) In HF there is H- bonding between HF molecules

C) The electro-negativity difference between F and H is much higher than other halides

D) The effect of nuclear charge is much reduced in fluorine which polarizes HF molecule

Q.3 Real gases show deviation from which of the following postulates of KMT.

A) Gases exert pressure

B) With the increases of temperature, kinetic energy increases

C) Elastic collision

D) There are no force of attraction or repulsion among the molecules of gases

Q.4 When oxygen contracts from 4.0 dm^3 to 2.0dm^3 the pressure increases 400 kP$_a$ to:

A) 600 kP$_a$

B) 800 kP$_a$

C) 200 kP$_a$

D) 500 kP$_a$

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Q.5 **The phenomenon in which an ionic compound shows more than one crystalline form is called:**

A) Polymorphism
C) Isomorphism
B) Allotropy
D) Isomerism

Q.6 **All of the following factors affect vapour pressure of liquid EXCEPT?**

A) Nature of liquid
C) Surface area
B) Temperature
D) Intermolecular forces

Q.7 **Which of the following gases shows more non-ideal behaviour?**

A) O_2
C) N_2
B) CO_2
D) H_2

Q.8 **Which of the following equations is used for real gases?**

A) Pv = nRT
C) $\frac{P_1V_1}{T_1} = \frac{P_2V_2}{T_2}$
B) $PV = \frac{1}{3}mNC^{-2}$
D) $\left(P_{obs} + \frac{n^2a}{v^2}\right)(V_{vessel} - nb)$

Q.9 **The gas laws can be summarized in the ideal gas equation PV = nRT which of the following statements is / are incorrect?**

A) One mole of any ideal gas occupies the same volume under the same condition of temperature and pressure

B) The density of an ideal gas at constant pressure is inversely proportional to temperature

C) Volume of a given mass of a gas increases two times if temperature is raised from 25°C to 50°C at constant pressure

D) Both A and B

Q.10 **Which of the following statements does not correctly represents the behavior of an ideal gas?**

A) PVm$\propto$ C
C) PM $\propto$dT
B) P $\propto$ CT
D) P $\propto \frac{1}{d}$

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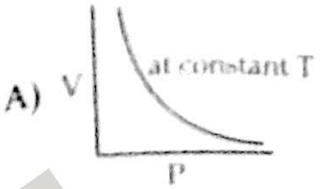
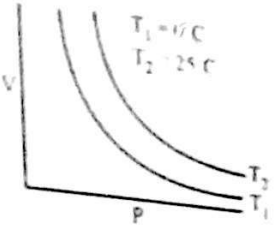
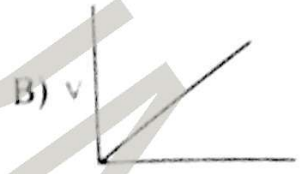
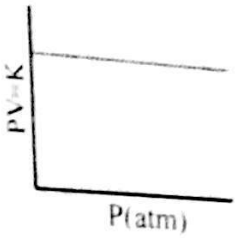
Q.11 In which of the following isotherms volume increases?

A) 

C) 

B) 

D) 

Q.12 Which of the following postulates of KMT explains Charles' law?

A) Gases exert pressure

B) With the increase of temperature kinetic energy increases

C) Gas molecules show electric collision

D) No attractive forces among gas molecules

Q.13 Under what condition of temperature and pressure will a real gas behave like an ideal gas?

Options	Temperature	Pressure
A)	Low	Low
B)	Low	High
C)	High	High
D)	High	Low

Q.14 Which of the following sets of solid elements A, B, C and D includes a giant metallic structure, a macromolecular structure and a simple molecular structure?

A) Na, Mg, Al

B) C, Si, Sn

C) Al, Si, S

D) Al, S, Si

Q.15 Which shows more than one kind of chemical bonding?

A) Brass

B) Diamond

C) Copper

D) Water

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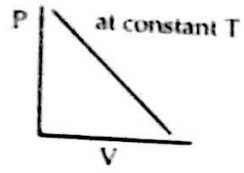
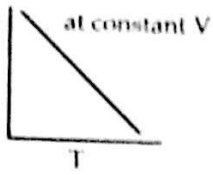
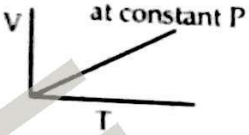
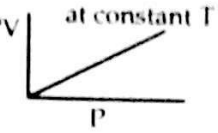
Q.16 Which of the following diagram correctly describes the behavior of a direct mass of an ideal gas (T is measured in k)

A) 

C) 

B) 

D) 

Q.17 Which of the following liquids has greater boiling point?

A) Acetone
B) Water
C) Diethyl ether
D) Glycerol

Q.18 Face centered cubic structure is shown by:

A) Cd
B) Na
C) Ag
D) Mg

Q.19 Calculate the density of (CO_2) methane at 0°C and 1atm pressure.

A) $= \frac{1\times 44}{0.0821\times 273}$

B) $= \frac{1\times 44}{0.0821\times 298}$

C) $= \frac{1\times 44}{8.3143\times 273}$

D) $= \frac{1\times 44}{1.987\times 273}$

Q.20 Which of the following molecules cannot form hydrogen bonding with each other?

A) NH_3
B) CH_3NH_2
C) CH_3OH
D) CH_3COCH_3

Q.21 London dispersion forces are the only forces present among the:

A) Molecules of water in liquid state
B) Atoms of helium in gaseous state at high temperature
C) Molecules of solid iodine
D) Molecules of hydrogen chloride gas

Q.22 All of the following molecules show hydrogen bonding EXCEPT:

A) HF molecules
B) Acetone and chloroform molecule
C) Water Molecules
D) HCl molecule

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Q.23 Which of the following are the strongest intermolecular forces?

A) Hydrogen bonding
B) London dispersion forces
C) Debye forces
D) Dipole dipole forces

Q.24 According to Boyle's law the volume of the given of a gas is inversely proportional to pressure at constant temperature. Mathematically Pv = k. The value of k depend on all of the following factors EXCEPT:

A) Amount of gas
B) Rate of diffusion of gas
C) Nature of gas
D) Temperature

Q.25 Which of the following laws can only be explained on the basis of Kelvin scale:

A) Boyle's law
B) Charles's law
C) Dalton's law
D) Avogadro's law

Q.26 Which of the following is/are application of general gas equation. It is used to determine:

A) Molecular mass of a gas only
B) Density of a gas only
C) Both A and B
D) Neither A nor B

Q.27 Although HF is more polar than H_2O, but even then boiling point of H_2O is greater than that of HF. It is because of:

A) HF is in the gaseous state
B) H_2O has two hydrogen bonds per molecule
C) HF is a weak acid
D) HF has one hydrogen bond per molecule

Q.28 Which of the following is correct decreasing order of boiling point of given liquids:

A) Water > Ethanol > HF > NH_3
B) Ethanol > HF > NH_3 > Water
C) NH_3 > HF > Water > Ethanol
D) HF > NH_3 > Ethanol > Water

Q.29 Iodine is in solid state and has greyish black colour it has all of the following properties EXCEPT:

A) It is a molecular solid
B) It shows face centered cubic structure
C) It has strong London dispersion forces
D) I – I bond distance in the crystal lattice is lower than that iodine in the gaseous state

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Q.30 Mark incorrect statement about diamond which is allotropic form of carbon:

A) It has two dimensional structure

B) It shows face centered cubic structure

C) It is a type of covalent solid

D) It is a non-conductor

Q.31 Identify the incorrect statement about giant structure of NaCl:

A) It shows face centered cubic structure

B) It has four formula per unit cell in the crystal lattice

C) The distance between two adjacent ions of different kind in the crystal lattice is 2.75A°

D) It is nonconductor in the solid state

Q.32 All of the following pair of crystalline solids are correctly matched w.r.t type of bonding EXCEPT:

Options	Crystalline solids	Nature of bonding
A)	Diamond, SiC	Covalent bond
B)	MgO, NaCl	Ionic bond
C)	Al, Zn	Metallic bond
D)	I_2, HCl	London dispersion forces

Q.33 Which of the following relationship is correct regarding van der waal's gas equation:

A) $a_{NH_3} > a_{N_2}$ but $b_{NH_3} < b_{N_2}$

B) $a_{NH_3} < a_{N_2}$ but $b_{NH_3} < b_{N_2}$

C) $a_{NH_3} < a_{N_2}$ but $b_{NH_3} > b_{N_2}$

D) $a_{NH_3} > a_{N_2}$ but $b_{N_2} > b_{NH_3}$

Q.34 The spontaneous change of a liquid into its vapours is called evaporation. Identify the incorrect statement about evaporation:

A) It is natural and continuous

B) It is exothermic

C) It causes cooling

D) It is surface phenomenon

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Q.35 Equal volumes of the all the ideal gases at the same temperature and pressure contains equal number of molecules. This is in accordance to:

A) Boyle's law
C) Charles's law
B) Avogadro's law
D) Dalton's law

Q.36 Under what conditions real gases behave like an ideal gas:

A) At low temperature and high pressure
B) At low temperature and low pressure
C) At high temperature and high pressure
D) At high temperature and low pressure

Q.37 Which of the following statements about ionic solids, covalent solids and molecular solids is incorrect:

Options	Properties	Ionic solids	Covalent solids	Molecular solids
A)	Example	NaCl, CaO	Diamond, SiC	I_2, CO_2, HCl, Ice
B)	Basic component	Ions	Atom	Molecule
C)	Electrical conductivity	Non-conductor in solid state	Non-conductor except graphite	Non-conductor except HCl in H_2O
D)	M.P and B.P	Very high M.Ps and B.Ps	Very low M.Ps and B.Ps	Low M.Ps and B.Ps

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ANSWER KEY (Worksheet-2)

1	B	11	C	21	C	31	C
2	B	12	B	22	D	32	D
3	D	13	D	23	A	33	A
4	B	14	C	24	B	34	B
5	A	15	D	25	B	35	B
6	C	16	B	26	C	36	D
7	B	17	D	27	B	37	D
8	D	18	C	28	A		
9	C	19	A	29	D		
10	D	20	D	30	A		

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Worksheet-3

(A. Physical Chemistry)

Atomic Structure

Q.1 The nucleus of an atom contains:

A) Always neutrons

B) Always protons and neutrons

C) Always protons only

D) Usually protons and neutrons

Q.2 In the periodic table elements are arranged in order of increasing their:

A) Mass number

B) Reactivity

C) Proton number

D) Density

Q.3 An atom with proton number of 19 and mass number of 40 is:

A) Found in Group - II

B) Found in the third period

C) Have same number of protons and electrons

D) Have same number of protons and neutrons

Q.4 The neutron particle has:

A) A mass of 1 gram

B) A mass approximately equal to that of proton

C) A charge equal but opposite to that of electron

D) Is present in all atoms

Q.5 The following is a list of proton number of some elements which represents an element which would not be in the same period as the rest of the elements?

A) 3

B) 10

C) 9

D) 12

Q.6 Which of the following particles contains 20 neutrons 19 protons and 18-electrons?

A) $^{39}_{19}K^{+}$

B) $^{40}_{18}Ar$

C) $^{39}_{19}K$

D) $^{39}_{20}Ca$

Q.7 Which of the following statements is incorrect?

A) Metals have 1 – 3 valence electrons

B) Non-metals have 4 – 7 valence electrons

C) Noble gases have 2 – 8 valence electrons

D) All the elements of IIIA group are metals

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Q.8 **All of the following statements are correct EXCEPT:**

A) Group number is based on valence electrons

B) Period is based on number of shells involved in the electronic configuration

C) Electrons present in the inner shells are called valence electrons

D) Block in the modern Periodic table is based on partially filled atomic orbitals

Q.9 **Which of the following has maximum number of unpaired electrons?**

A) Fe^{+3} C) Zn

B) Ni^{+2} D) Cu^{+}

Q.10 **The lowest principal quantum number that an electron can have is:**

A) 0 C) 1

B) 2 D) 3

Q.11 **The relative energy of 4s, 4p and 3d orbitals are in the order.**

A) 3d < 4p < 4s C) 4s < 4p < 3d

B) 4s < 3d < 4p D) 4p < 3d < 4s

Q.12 **With increase in the value of principal quantum number 'n' the shape of the s-orbitals remain same although their sizes.**

A) Increase

B) Decrease

C) Remain the same

D) May or may remain the same

Q.13 **All of the following are application of quantum numbers EXCEPT:**

A) To find group of elements

B) To find block of elements

C) To find period of elements

D)To determine I.E1 of elements

Q.14 **In a multi-electron atoms the energy of the electrons in a particular orbital is determined by:**

A) n C) n + *l*

B) n+ *l*, m D) n, *l*, m,s

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Q.15 **The facts that the two electrons in an atomic orbital must have opposite spin is deduced from:**

A) Hund's Rule

B) Pauli Exclusion Principle

C) Aufbau Rule

D) Heisenberg's Uncertainty Principle

Q.16 **All of the following statements about ionization energy are correct EXCEPT**

A) Successive ionization energies of an element increase

B) Atom of the element must be in the gaseous state before loss of electron

C) Element which have stable electronic configuration have greater ionization energy

D) Ionization Energy may or may not endothermic process

Q.17 **Which of the following elements has greater first ionization energy?**

A) Si

B) C*l*

C) P

D) A*l*

Q.18 **Consider the following thermo-chemical equation**

$$Na_{(s)} \longrightarrow Na^{+}_{(g)} + e^{-}$$

The enthalpy involved change in the above ionization of the solid sodium into gaseous Na^{+} ion is:

A) 1st Ionization energy (ΔH_i)

B) ΔH sub

C) $\Delta Ha + \Delta H_i$

D) ΔHa

Q.19 **An atomic orbital may never be occupied by:**

A) 1 electron

B) 3 electron

C) 2 electron

D) Zero electron

Q.20 **Where in a periodic series do you find strong base-formers?**

A) Insert gases

C) Middle

C) Right

D) Left

Q.21 **Which of the following is proper order of characteristic features of quantum numbers?**

A) Size, Shape, Orientation

B) Orientation, Size, Shape

C) Shape, Size, Orientation

D) Shape, Orientation, Size

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Q.22 **Which of the following formula is used to determine number of electrons in a sub-shell?**

A) $2n^2$

B) $l = n - 1$

C) $2(2l + 1)$

D) $m = 2l + 1$

Q.23 **Which of the following ions has more electrons than protons and more protons than neutrons:**

A) D^{-1}

B) He^{+}

C) OD^{-}

D) OH^{-}

Q.24 **Identify the incorrect statement about electron affinity**

A) Elements having stable electronic configuration have high electron affinity

B) Elements of 3rd period have greater electron affinity that of 2nd period

C) It is associated with element

D) Element must be in the gaseous state before gain of electron

Q.25 **In which of the following pair of elements, first element of the pair has comparatively greater electron affinity:**

A) F, Cl

B) S, O

C) N, P

D) B, Al

Q.26 **In Which of the following pairs of element, 1st element of the pair has lower ionization energy:**

A) N , O

B) Ne, F

C) Mg , Al

D) S,P

Q.27 **Which of the following is correct electronic configuration of Copper atomic number (Cu=29)**

A) [Ar] $3d^9$, $4s^2$

B) [Ar] $3d^{10}$, $4s^1$

C) [Kr] $3d^9$, $4s^2$

D) [Kr] $3d^{10}$, $4s^1$

Q.28 **Correct electronic configuration of potassium (atomic number K=19)**

A) [Ar] $4s^1$

B) [Ne] $4s^2$

C) [Kr] $4s^2$

D) [Kr] $4s^1$

Q.29 **Which of the following atoms represent isotones?**

A) ${}^{12}_{6}C$, ${}^{13}_{6}C$, ${}^{14}_{6}C$

B) ${}^{40}_{18}Ar$, ${}^{40}_{20}Ca$, ${}^{41}_{21}Sc$

C) ${}^{40}_{18}Ar$, ${}^{42}_{20}Ca$, ${}^{43}_{21}Sc$

D) ${}^{14}_{7}N$, ${}^{16}_{8}O$, ${}^{18}_{9}F$

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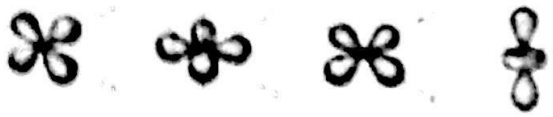
Q.30 Followings are all the d-orbitals.



I II III IV

Which of the following is a shape of dz^2 orbital?

A) I
C) II
B) IV
D) III

Q.31 Mark the incorrect statement:

A) Number of protons in the nucleus of an atom is called proton number and it shown by Z

B) Sum of protons and neutrons in the nucleus of an atom is called nuclear number and is shown by A

C) Number of neutron = A − Z

D) Number of protons and electrons in an cation is equal

Q.32 Properties of three fundamental particles are given in the tabular form:

	Particles	Charge	Relative charge	Mass (kg)	Deflection under electric field
I	Proton	$+1.6022 \times 10^{-19}$	+1	1.6726×10^{-27}	Deflects toward negative pole
II	Neutron	0	0	1.6505×10^{-27}	Undeflected
III	Electron	1.6022×10^{-19}	-1	9.1095×10^{-31}	Deflects towards positive pole

Identify which one are not correctly matched:

A) I
C) III
B) II
D) I and III

Topic According to NUMS Syllabus (Different From UHS Syllabus)

Discovery of Nucleus, Bohr's Atomic model and its application, Plank's Quantum Theory and X-Rays

Q.33 Rutherford's model of atom failed because:

A) The atom did not have a nucleus and electrons

B) It did not account for the attraction between protons and neutrons

C) It did not account for the stability of the atom

D) There is actually no space between the nucleus and the electrons

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Q.34 Bohr model of atom is contradicted by:

A) Planck's quantum theory

B) Heisenberg's uncertainty principle

C) Photoelectric effect

D) Dual nature of electrons

Q.35 All of the following statement about Rutherford's atomic model are correct EXCEPT:

A) Most of the part of atom is empty

B) Central part of the atom is positively charged which is called nucleus

C) He proposed the planetary model of atom (similar to the solar system)

D) All the particles are present in the nucleus except electrons

Q.36 According to quantum theory of radiation, all of the following mathematical relationship are correct EXCEPT:

A) $E \propto v$

B) $E \propto \frac{1}{\lambda}$

C) $\bar{v} = \frac{1}{\lambda}$

D) $E \propto \frac{1}{\bar{v}}$

Q.37 According to Bohr's hydrogen atomic model, if electron is present in 2nd shell (n = 2), the values of radius (for 2nd orbit) is:

A) 2.116A°

B) 2.216A°

C) 2.135A°

D) 2.345A°

Q.38 Bohr's hydrogen atomic model theory is applicable for all of the following species EXCEPT:

A) H

B) He^{+1}

C) Li^{+2}

D) Be^{+2}

Q.39 Which of the following statement about Bohr's hydrogen atomic model is incorrect:

A) $r_2 - r_1 < r_3 - r_2 < r_4 - r_3$

B) $E_2 - E_1 > E_3 - E_2 > E_4 - E_3$

C) Energy of electron is directly proportional to n^2 (n = shell number)

D) According to him electrons not only revolve round the nucleus in circular orbit but also in elliptic orbit

Q.40 X-rays show all of the following properties EXCEPT:

A) They are electromagnetic radiation

B) They travel with the elasticity of light

C) They have greater frequency than gamma rays

D) They are used to diagnose fracture in bones

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ANSWER KEY (Worksheet-3)

1	D	11	B	21	A	31	D
2	C	12	A	22	C	32	B
3	C	13	D	23	D	33	C
4	B	14	C	24	A	34	B
5	D	15	B	25	B	35	C
6	A	16	D	26	D	36	D
7	D	17	B	27	B	37	A
8	C	18	C	28	A	38	D
9	A	19	B	29	C	39	D
10	C	20	D	30	B	40	C

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Worksheet-4

(A. Physical Chemistry)

Chemical Bonding

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Q.1 Which of the following molecule does not have planar geometry?

A) Benzene

B) Boron trifluoride

C) Ethene

D) Phosphorous trichloride

Q.2 Which pair of compounds contain one that is giant ionic and one that is simple molecule?

A) Al_2O_3 and Al_2Cl_6

B) P_4O_{10} and PCl_3

C) SiO_2 and $SiCl_4$

D) HF and $PbCl_4$

Q.3 Which molecule has non-coplaner tetrahedral geometry only?

A) NF_3

B) C_3H_8

C) C_2Cl_4

D) C_3H_6

Q.4 Ionic compounds show all of the following properties EXCEPT:

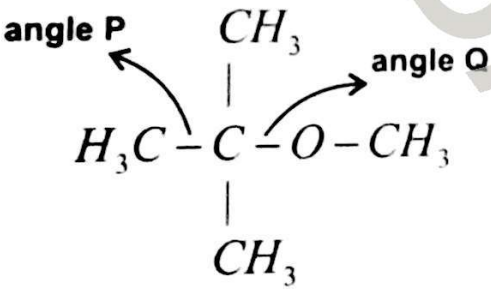
A) All are present in the solid state

B) All conduct electricity in the molten state

C) All show polymorphism and isomerism

D) All have non-directional and non-rigid bond

Q.5 MTBE (Methyl tertiary butyl ether) is a constituent of Petrol. Its structural formula is shown below.



What are the value of angle P and angle Q in a molecule of MTBE?

Options	Angle P	Angle Q
A)	90°	105°
B)	90°	180°
C)	109°	105°
D)	90°	180°

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Q.6 **According to VESPER theory, which of the following is not the basic condition for the regular geometry:**

A) Central atom is surrounded by similar atoms

B) Central atom has no lone pair

C) Molecule has similar bonds

D) The electronegativity of central or surrounding atoms affect the bond angle

Q.7 **Majority of the compounds in nature are:**

A) Electro-covalent

B) Dative covalent

C) Ordinary covalent

D) Hydrogen bond

Q.8 **Which property is not shown by covalent compounds?**

A) Are present in the gas, liquid solid state

B) Are more reactive than ionic compounds

C) Show resonance and isomerism

D) Have low melting points and boiling points as compared to ionic compounds

Q.9 **Which one of the following molecules shows a linear geometry?**

A) H_2O

B) Cl_2O

C) HCN

D) C_2H_4

Q.10 **Second and high electron affinity are positive because of:**

A) Repulsion between electrons and negatively charged ions

B) Attraction between electron by positively charged ions

C) First repulsion between electrons and then attraction

D) Both A and B

Q.11 **In which of the following ionic bond is formed between named atoms?**

A) Al and Cl

B) H and Cl

C) B and F

D) Na and H

Q.12 **Which of the following molecules has six bonding electrons?**

A) C_2H_4

B) H_2S

C) CO_2

D) NCl_3

Q.13 **If two atoms are bonded in such a way that one member of the covalently bonded molecule donates both electrons that are shared, then what is this type of bond called?**

A) H-bonding

B) Covalent

C) Coordinate covalent

D) Electron violent bond

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Q.14 Which of the following molecules shows tetrahedral geometry?

A) $\overset{oo}{NH_3}$

C) SO_4^{2}

B) SO_3

D) SO_2

Q.15 Which type of bonding is responsible for intermolecular forces in liquid CCl_4?

A) Covalent bonding

B) Hydrogen bonding

C) Instantaneous dipole – induced dipole

D) Dipole – Dipole forces

Q.16 The C_2H_2 molecule is linear which can be deduced from the numbers of δ and π bond present in the molecule?

Options	δ	π
A)	2	2
B)	2	3
C)	3	2
D)	3	1

Q.17 Which of the following giant solids on the basis of type of bonding have greater melting points and boiling points?

A) Metallic solids

C) Ionic solids

B) Covalent solids

D) Molecular solids

Q.18 All of the following factors are increases with bond energy EXCEPT.

A) Electronegative difference

B) Bond order

C) s-character

D) Number of lone pair

Q.19 Which of the following molecules has greater bond energy?

A) $H-H$

C) $O-O$

B) $N-N$

D) $Cl-Cl$

Q.20 Which of the following has trigonal planar geometry?

A) SO_2

C) SO_3

B) CCl_4

D) H_2O

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Q.21 **Mark the incorrect statement about the type of intermolecular forces present in the indicated molecule.**

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Option	Molecule	Type of intermolecular forces
A)	HCl	Debye forces
B)	$CHCl_3$	Dipole Dipole forces
C)	Halogens in liquid state	London Dispersion forces
D)	Noble gases in liquid state	London Dispersion forces

Q.22 **All of the following molecules have H – bonding EXCEPT:**

A) Ethanol
B) Ethanoic acid
C) Amino Methane
D) Propanone

Q.23 **Which of the following will not form H-bond with another of its own molecule:**

A) CH_3CHO
B) CH_3NH_2
C) CH_3OH
D) NH_3

Q.24 **Solid carbon dioxide (dry ice) is used as a refrigerating agent because it readily changes directly from the solid in to the vapor state at low temperature. What does this indicate the main intermolecular bonding in $CO_{2(s)}$ to be?**

A) Covalent bonding
B) Ionic bonding
C) Hydrogen bonding
D) London dispersion forces

Q.25 **Which of the following theory was put forward by Drude and extended by Loren (1923). Which explain the property of metallic solid:**

A) Electron gas theory
B) Valance bond theory
C) Band theory
D) Crystal field theory

Q.26 **When heated solid iodine readily forms iodine vapor. What does this information suggest about the nature of particles in these two physical states of Iodine?**

Option	Solid	Vapor
A)	Ionic	Atomic
B)	Ionic	Molecular
C)	Molecular	Atomic
D)	Molecular	Molecular

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Q.27 Magnesium oxide is used to line industrial furnaces because it has a very high melting point. Which type of bond needs to be broken for magnesium oxide to melt?

A) Co-ordinate
B) Ionic
C) Covalent
D) Metallic

Q.28 All of the following are correct statements regarding difference between polar and non-polar bond except:

Option	Non-Polar	Polar
A)	It is a covalent bond which exist between two similar atom or those having negligible electronegativity difference.	It is a covalent bond which exist between two disimilar atoms or those having appreciable electronegativity difference but less than 1.7.
B)	It is weaker bond	It is stronger bond
C)	It has no polarity	It has always polarity in the molecule
D)	It is more reactive	It is less reactive

Q.29 All of the following are correct statement regarding difference between sigma bond and pi- bond EXCEPT:

Option	Sigma bond	Pi bond
A)	It is formed by linear overlapping of two half filled atomic orbitals	It is formed by side wise over lapping of two half filed parallel atomic orbital
B)	It has restricted rotation about the inter-nuclear axis	It has free rotation about the inter nuclear axis
C)	It has one lobe of electron density between the nuclei	It has two lobes of electron density on opposite sides of inter nuclear axis
D)	It has symmetrical charge density	It has no symmetrical charge density

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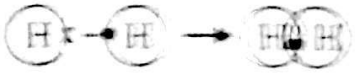
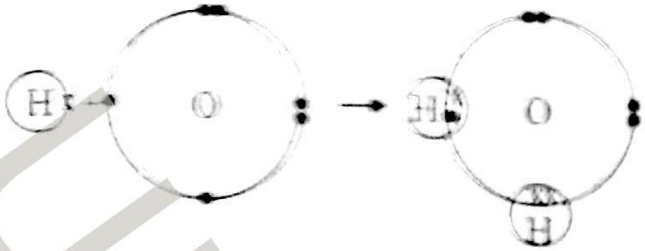
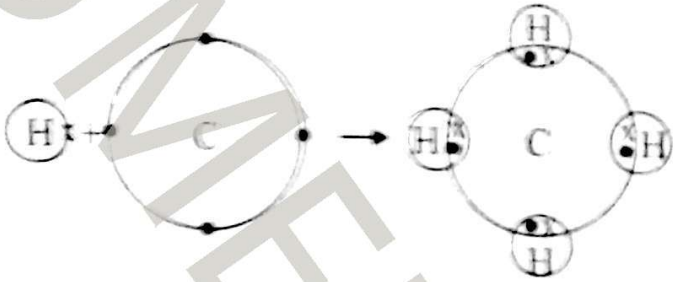
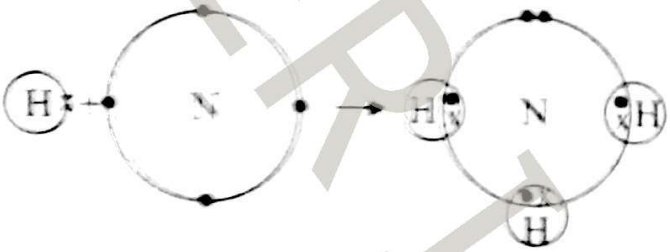
Q.30 **All of the following show dot-and-cross model diagram EXCEPT:**

A) 

B) 

C) 

D) 

Q.31 **The distance between the nuclei of two atoms forming a covalent bond is called the bond length. All of the following statements are correctly matched EXCEPT:**

Options	Compound	Hybridization	Bond	Bond Length (pm)
A)	SiH_4 (Monosilane)	sp^3	C = O	148
B)	C_2H_4 (Ethene)	sp^2	C = C	154
C)	BF_3 (Boron trichloride)	sp^2	B – Cl	175
D)	C_2H_2 (Ethyne)	sp	C ≡ C	120

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ANSWER KEY (Worksheet-4)

1	D	11	D	21	A	31	B
2	A	12	D	22	D		
3	B	13	C	23	A		
4	C	14	C	24	D		
5	C	15	C	25	A		
6	D	16	C	26	D		
7	C	17	B	27	B		
8	B	18	D	28	D		
9	C	19	A	29	B		
10	A	20	C	30	B		

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Worksheet-5

(A. Physical Chemistry)

Chemical Energetics (Solutions NUMS)

Q.1 **For the reaction $NaCl_{(s)} \xrightarrow{Water} Na^{+}_{(aq)} + Cl^{-}_{(aq)}$ the change in enthalpy is called:**

A) Heat of reaction
B) Heat of combustion
C) Heat of formation
D) Heat of solution

Q.2 **Evaporation of water is an exceptional case of:**

A) Spontaneous
B) Decomposition
C) Non-spontaneous
D) Hydrolysis

Q.3 **Which statement is contrary to the first law of thermodynamics?**

A) Energy can neither be created nor destroyed
B) One form of energy can be converted into other form of energy
C) In an adiabatic process the work done is independent of its path
D) Continuous production of mechanical work without supplying an equivalent amount of heat is possible

Q.4 **Born Haber's cycle enables us to calculate:**

A) Heat energy
B) Heat of hydration
C) Lattice energy
D) Heat of solution

Q.5 **Which statement is not correct about ΔH^{o}?**

A) ΔH^{o} of the reaction depends on temperature
B) ΔH^{o} of reaction can be > or < zero
C) ΔH^{o} of catalyzed and uncatalyzed is same
D) ΔH^{o} is lways < 0

Q.6 **Which of the following processes is always endothermic?**

A) Atomization
B) Combustion
C) Neutralization
D) Solution

Q.7 **Which statements are correct for the neutralization of a strong acid by a strong alkali in aqueous solution at 25°C?**

A) It is an endothermic process
B) It can be represented as

$$H_3O^{+}_{(aq)} + OH^{-}_{(aq)} \longrightarrow 2H_2O_{(l)}$$

C) The enthalpy change per mole of H_2O formed is independent of the acid or alkali used as they are strong
D) Both B and C

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Q.8 According to Born Haber cycle, ΔH_{latt} of ionic compound is determined by the formula $\Delta H_{latt.}$

A) $\Delta H_{latt} = \Delta H_f - \Delta H_x$

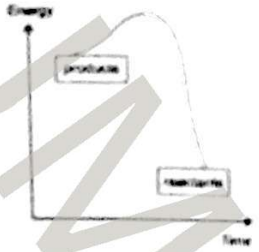
B) $\Delta H_{latt} = \Delta H_x - \Delta H_f$

C) $\Delta H_{latt} = \Delta H_x + \Delta H_f$

D) $\Delta H_{latt} = \Delta H_a - \Delta H_x$

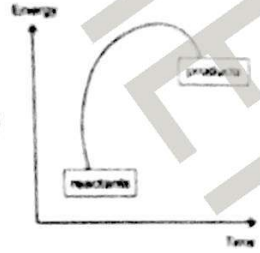
Q.9 Which of the following energy profile diagrams best shows an endothermic reaction.

A)

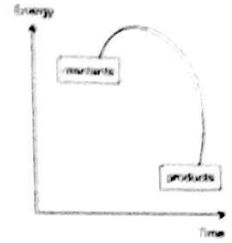


C)

B)



D)



Q.10 All of the following is / are applications of $\Delta H_{latt.}$ of ionic compounds EXCEPT?

A) Structure

B) Properties

C) Bonding

D) Dipole Moment

Q.11 The number of moles of sodium hydroxide present in $2.5dm^3$ of 0.5M aqueous solution is:

A) 1.25

B) 12.5

C) 0.5

D) 5.0

Q.12 All of the following reactions are exothermic EXCEPT:

A) $N_{2(g)} + 3H_{2(g)} \rightleftharpoons 2NH_{3(g)}$

B) $C_{(s)} + O_{2(g)} \longrightarrow CO_{2(g)}$

C) $N_{2(g)} + O_{2(g)} \longrightarrow 2NO_{(g)}$

D) $H_{2(g)} + \frac{1}{2}O_{2(g)} \longrightarrow H2O_{(l)}$

Q.13 For which of the following compound ΔH° can be measured directly by calorimeter:

A) CCl_4

B) Al_2O_3

C) B_2O_3

D) MgO

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Q.14 **All of the following are state functions EXCEPT?**

A) E
C) H
B) G
D) q

Q.15 **All of the following ΔH° have only positive value EXCEPT:**

A) ΔH_v
C) ΔH°_{BDE}
B) ΔH°_{sol}
D) ΔH_i

Q.16 **12.0g of graphite is burnt in a bomb calorimeter and temperature recorded is 5K. Calculate the enthalpy of combustion (ΔH°_c) of graphite if the heat capacity of the calorimeter is 90.0kJmol^{-1}?**

A) -440kJmol^{-1}
C) -450kJmol^{-1}
B) -445kJmol^{-1}
D) -455kJmol^{-1}

Q.17 **Glass calorimeter is used to determine:**

A) ΔH°_n
C) ΔH°_{sol}
B) ΔH°_a
D) ΔH°_f

Q.18 **Neutralization of 50cm^3 of 0.5M NaOH at 25°C with 50cm^3 of 0.5M HCl 25°C is raised to 31°C. Find enthalpy of neutralization (ΔH°_n). Specific heat of water (q) = 5kJ^{-1}kg^{-1}:**

A) -50kJmol^{-1}
C) -60kJmol^{-1}
B) -55kJmol^{-1}
D) -65kJmol^{-1}

Q.19 **The change in enthalpy of the given reaction is:**

$$NaOH + HCl \rightarrow NaCl + H_2O$$

A) Heat of reaction
C) Heat of fusion
B) Heat of neutralization
D) Heat of combustion

Q.20 **Which of the following statement is not correct for ΔE and ΔH:**

Options	ΔE (Change in internal energy)	ΔH (Change in enthalpy)
A)	$\Delta E = q_v$	$\Delta H = q_p$
B)	$\Delta E = q + P\Delta V$	$\Delta H = \Delta E + P\Delta V$
C)	ΔE is measured at constant volume	ΔH is measured at constant pressure
D)	$q_v > q_p$	$q_p = p_v$

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Topic According to NUMS Syllabus (Different From UHS Syllabus)
Solutions, Application of Colligative Properties, Colloids, Properties and Types of Coiled

Q.21 The nature of an aqueous solution of ammonia (NH_3) is:

A) Amphoteric
B) Basic
C) Neutral
D) Acidic

Q.22 An aqueous solution of ethanol in water may have vapour pressure:

A) Equal to that of water
B) Equal to that of ethanol
C) More than that of water
D) Less than that of water

Q.23 The solution which has lower osmotic pressure is called:

A) Hypotonic solution
B) Hypertonic solution
C) Isotonic solution
D) Saturated solution

Q.24 Molal boiling point constant (K_b) is related to:

A) m
B) ppm
C) M
D) x

Q.25 All of the followings are examples of pair of partially miscible liquids except:

A) Iodine water system
B) Triethyamine water system
C) Nicotine water system
D) Phenol water system

Q.26 Which of the following aqueous solution has lowest vapour pressure at room temperature:

A) 0.1m NaCl solution
B) 0.1m $CaCl_2$ solution
C) 0.1m glucose solution
D) 0.1m urea solution

Q.27 To observe the colligative properties, following conditions should be fulfilled by the solution EXCEPT:

A) Solution should be dilute
B) Solute should be non-electrolyte
C) Solute should be non-volatile
D) Solute can be volatile and non-electrolyte

Q.28 Which of the following is colligative property:

A) Osmotic-pressure
B) Freezing point
C) Boiling point
D) Melting point

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Q.29 **Two solutions of NaCl and KCl having 0.1m concentration are prepared separately which of the following statement is true for the solution:**

A) KCl solution will have higher boiling point than NaCl solution

B) Both the solutions have different boiling points

C) KCl and NaCl solutions possess same vapour pressure

D) KCl solution possesses lower freezing point than NaCl solution

Q.30 **Molarity of pure water is:**

A) 5.55

B) 55.0

C) 55.5

D) 55.1

Q.31 **Internal energy of a system depends on all the factors EXCEPT:**

A) Chemical nature of a substance

B) Temperature

C) Pressure and volume

D) Path

Q.32 **Ionic solid is dissolved in water if:**

A) $\Delta H_{latt} > \Delta H_{hyd}$

B) $\Delta H_{hyd} > \Delta H_{latt}$

C) $\Delta H_{hyd} = \Delta H_{latt}$

D) $\Delta H_{latt} \leq > \Delta H_{hyd}$

Q.33 **When there are three components of solution, which one of the following unit of concentration for this solution is used:**

A) Molarity

B) Molality

C) Mole fraction

D) ppm

Q.34 **The colligative property that is generally applied preferably for the determination of molecular mass of macromolecule is:**

A) Π

B) ΔT_b

C) ΔT_f

D) $\Delta P/P^o$

Q.35 **Which of the following is example of solution in which solute is in the solid state while solvent is in the liquid state:**

A) Paint

B) Steel

C) Fog

D) Milk

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Q.36 **The temperature at which two conjugate solutions merge into one another is called:**

A) Upper consulate temperature

B) Optimum temperature

C) Transition temperature

D) Absolute temperature

Q.37 **If mass of solvent is 100g and molal concentration of its solution is 0.2, the amount of urea dissolved in solvent (molar mass of solute is 60gmol^{-1}) is:**

A) 1.2g

B) 1.0g

C) 0.5g

D) 0.75g

Q.38 **A sample of tooth paste having 100g, was found to contain 0.5g fluoride ions. The concentration of fluoride in ppm is:**

A) 1.5×10^3

B) 1.25×10^3

C) 5×10^3

D) 2.5×10^3

Q.39 **18g glucose is dissolved in 90g of water. The relative lowering of vapour pressure is equal to:**

A) $\frac{1}{51}$

B) 5.1

C) $\frac{1}{5}$

D) 6

Q.40 **A pure solvent has a vapour pressure of 120 torr at 25°C. When 20g of non-volatile solute was dissolved in 300g of benzene, a vapour pressure of 115 torr was observed (molar mass of benzene=80). What is the molar mass of solute?**

A) 128g

B) 160g

C) 140g

D) 180g

Q.41 **A colloidal system involves**

A) A state of dissolution

B) A state of homogenous mixture

C) A state of dispersion

D) A state of suspension

Q.42 **Solvent loving colloids are called:**

A) Lyophobic acid

B) Hydrophobic colloids

C) Lyophilic collides

D) Mesophobic colloids

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Q.43 **The fresh precipitate can be passed in colloidal state by**

A) Pepitzation
B) Diffusion
C) Coagulation
D) Effusion

Q.44 **A colloidal solution of $Fe(OH)_3$ in water is:**

A) Hydrophilic colloid
B) A hydrophobic colloid
C) An emulsion
D) Lyophilic colloid

Q.45 **Butter is:**

A) Fat dispersed in water
B) Water dispersed in fat
C) Fat disperses in milk
D) Water dispersed in milk

Q.46 **The addition of alcohol to a saturated aqueous solution of calcium acetate first forms a sol and then sets to a gelatinous mass called solid alcohol which is a:**

A) Solid sol
B) Solid form
C) Aerosol
D) Gel

Q.47 **Smoke is:**

A) Carbon dispersed in air
B) Carbon dispersed in liquid
C) Air dispersed in carbon
D) Air dispersed in liquid

Q.48 **The colloidal solution of gold prepared by different method have different colours due to:**

A) Difference in the size of colloidal particles
B) Fact that gold exhibit variable valency
C) Different conc. of gold
D) Presence of different type of foreign particles

Q.49 **Foam is a colloidal solution of:**

A) Gaseous particles dispersed in gas
B) Gaseous particles dispersed in liquid
C) Solid particles dispersed in liquid
D) Solid particles dispersed in gas

Q.50 **The amount of solute present in a fixed amount of solvent or solution is called:**

A) Concentration of solution
B) Molar solution
C) Molal solution
D) ppm Solution

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ANSWER KEY (Worksheet-5)

1	D	11	A	21	B	31	D	41	C
2	A	12	C	22	C	32	B	42	C
3	D	13	D	23	A	33	C	43	A
4	C	14	D	24	A	34	A	44	B
5	D	15	B	25	A	35	A	45	B
6	A	16	C	26	B	36	A	46	D
7	C	17	A	27	D	37	A	47	A
8	A	18	C	28	A	38	C	48	A
9	B	19	B	29	C	39	A	49	B
10	D	20	D	30	C	40	A	50	A

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Worksheet-6

(A. Physical Chemistry)

Electrochemistry

Q.1 **By electrolysis of brine solution which of the following is deposited/released at anode?**

A) H_2

B) O_2

C) Cl_2

D) Na

Q.2 **Which of the following is reducing agent?**

A) $(COOH)_2$

B) F_2

C) CO_2

D) HNO_3

Q.3 **Oxidation number of nitrogen in NO_3^- is**

A) + 2

B) + 6

C) + 4

D) + 5

Q.4 **Which of the following elements in glucose has zero oxidation state?**

A) C

B) O

C) H

D) Both A and B

Q.5 **All of the following statements about (oxidation) state is / are correct EXCEPT:**

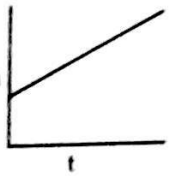
A) It is apparent charge on an atom in a compound

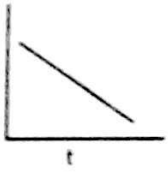
B) Its value is either zero, positive or negative

C) It can be variable

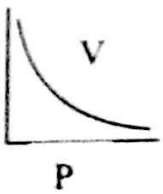
D) Xenon (Xe) can show maximum oxidation state +6

Q.6 **Electrolysis of $CuSO_{4(aq)}$ was carried out using Cu – electrode and a steady current which graph shows the change in mass of the cathode with time.**

A) 

C) 

B)

D) 

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Q.7 **In the extraction of Al by electrolysis, why is it necessary to dissolve Al_2O_3 in molten cryolite?**

A) Cryolite provides the ions needed to carry current

B) To decrease high melting point of the electrolyte

C) Cryolite reacts with Al_2O_3 to form ions

D) Molten Al_2O_3 would not conduct electricity

Q.8 **In $FeCl_3$ the oxidation state of Cl is:**

A) Zero

B) + 1

C) – 1

D) – 2

Q.9 **The process of decomposition of an electrolyte in solution or molten states by the passage of electric current is called electrolysis? All of the following statements about products as a result of electrolysis are correct EXCEPT:**

A) They may be get deposited/released on the electrode surface

B) They may go out in the form of gases

C) Electrolytic material may get dissolved into the solution as ions

D) In Nelson cell, Na metal is a product

Q.10 **Which of the following is not a good conductor of electricity?**

A) $NaCl_{(aq)}$

B) $NaCl_{(molten)}$

C) $NaCl_{(s)}$

D) Silver metal

Q.11 **Li^+ has a smaller ionic mobility than K^+ because of the:**

A) Larger size of Li^+

B) Greater degree of hydration of Li^+

C) Larger radius to charge ratio of Li^+

D) Smaller nuclear charge of Li^+

Q.12 **All of the following is / are characteristic of electrolytic cell EXCEPT:**

A) It involves conversion of electrical energy into chemical energy

B) In it anode has negative charge and cathode positive charge

C) It is reverse of addition reaction

D) It is endothermic process

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Q.13 **Which of the following is correct order of deposition of positive ion at cathode?**

A) $Ag^{+}, Cu^{+2}, H^{+}, Pb^{+2}$

B) $Cu^{+2}, Ag^{+1}, H^{+}, Pb^{+2}$

C) $Ag^{+1}, H^{+}, Pb^{+2}, Cu^{+2}$

D) $H+, Ag^{+1}, Cu^{+2}, Pb^{+2}$

Q.14 **Which of the following is correct order of deposition of negative ions on the anode electrode?**

A) $I^{-}, Br^{-}, OH^{-}, NO_3^{-1}$

B) $Br^{-}, OH^{-}, NO_3^{-1}, I^{-1}$

C) $OH^{-}, Br^{-}, I^{-1}, NO_3^{-1}$

D) $NO_3^{-1}, Br^{-}, OH^{-}, I^{-1},$

Q.15 **Na metal cannot be produced by electrolysis of aqueous solution of NaCl.**

A) Na reacts with water

B) Na^{+} is more stable than Na atom

C) Na^{+} reacts with Cl^{-} ion in the solution

D) Reduction of H_2O is preferred to Na^{+}

Q.16 **Which of the following is wrong about electrolysis?**

A) It is used for the extraction of metals from their ores

B) It is used for the purification of metals

C) It is used for the extraction of blistered copper from electrolytic copper

D) It is used for the manufacture of alkali

Q.17 **In which one of the following reactions hydrogen behave as an oxidizing agent?**

A) $H_2 + Cl_2 \rightarrow 2HCl$

B) $C_2H_4 + H_2 \rightarrow C_2H_6$

C) $2Na + H_2 \rightarrow 2NaH$

D) $N_2 + 3H_2 \rightarrow 2NH_3$

Q.18 **When a dilute solution of salt water is electrolyzed, a colourless gas is given off at the anode. The gas is:**

A) Hydrogen

B) Oxygen

C) Steam

D) Chlorine

Q.19 **Coinage metal Cu, Ag, Au, are the least reactive because they have:**

A) Negative reduction potential

B) Negative oxide potential

C)Positive reduction potential

D) Positive oxide potential

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Q.20 The circuit shown in diagram was set up:

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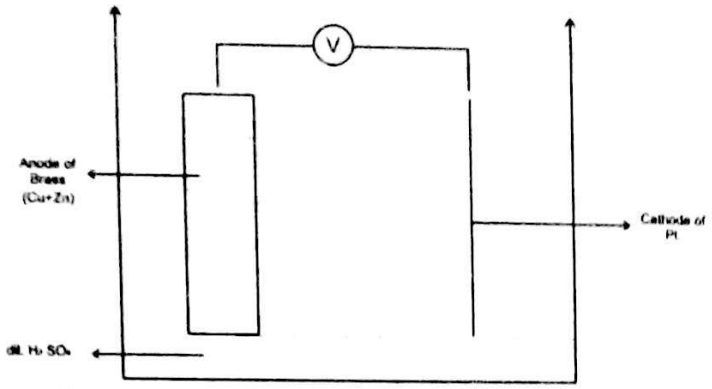

Which electrode reaction will occur?

Options	Anode Reaction	Cathode Reaction
A)	Cu dissolves preferentially	Cu is precipitated
B)	Cu dissolves preferentially	Hydrogen gas is evolved
C)	Zn and Cu both dissolves	Hydrogen gas is evolved
D)	Zn dissolves preferentially	Hydrogen gas is evolved

Q.21 Consider the following redox reaction

$K_2Cr_2O_7+7H_2SO_4+6FeSO_4 \rightarrow$

$K_2SO_4+Cr_2(SO_4)_3+3Fe_2(SO_4)_3+7H_2O$

In this reaction

I) $FeSO_4$ acts as an reducing agent

II) $K_2Cr_2O_7$ acts as an oxidizing agent

III) $Cr^{+6}{}_{(aq)}$ is reduced to Cr^{+3}

IV) Fe^{+3} is oxidized to Fe^{+2}

Which of the following statements are correct regarding this redox reaction.

A) I and II only

B) II and III only

C) I , II , III

D) I , II , III , and IV

Q.22 All of the following are reducing agents EXCEPT:

A) $FeSO_4$

B) H_2S

C) $(COOH)_2$

D) CO_2

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Q.23 **The potential set up when an electrode is in contact with 1M solution of its own ions at 298 K is known as standard electrode potential (or standard reduction potential denoted by E°). All of the following statements about standard electrode potential are correct except:**

A) Smaller is the E°_{red}, greater is the reducing power of a metal

B) E°_{red} of Li^+ is minimum (-3.04V)

C) Greater is the E°_{red}, greater is the oxidizing power of a non-metal

D) E°_{red} of Cl_2 is maximum (+2.87V)

Q.24 **Identify incorrect statement about standard hydrogen electrode:**

A) It is used as a reference electrode

B) Its E°_{red} is zero or less than zero

C) When it is connected to zinc electrode in a galvanic cell, it act as cathode

D) When it is connected to Cu electrode in a galvanic cell, it act as anode

Q.25 **If in a Galvanic cell**

- **Zn^{+2}/Zn° E°_{red} = -0.76 V**
- **Cu^{+2}/Cu° E°_{red} = + 0.34 V**

The standard cell potential (E°_{cell}) of this Galvanic cell is:

A) + 1.10 volts

B) – 0.42 volts

C) -1.10 volts

D) + 0.42 volts

Q.26 **On the basis of knowledge of electrochemical series, which reaction is not feasible:**

A) $Zn + H_2SO_{4\,(dil)} \rightarrow ZnSO_4 + H_2$

B) $F_2 + KCl \rightarrow 2KF + Cl_2$

C) $Cu + H_2SO_{4\,(dil)} \rightarrow CuSO_4 + H_2$

D) $Cl_2 + 2KBr \rightarrow 2KCl + Br_2$

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Q.27 **When elements are arranged in the order of their standard electrode potential on the basis of hydrogen scale, the resulting list of elements is known as Electrochemical series.**

Mark the incorrect statement about electrochemical series:

A) Every top metal can displace lower one

B) Every lower non- metal can displace higher one

C) $E^{o}_{cell} = E^{o}_{oxid} + E^{o}_{red}$

D) E^{o}_{red} increases from bottom to top

Q.28 **Identify the incorrect statement:**

A) Every top metal acts as anode

B) Every lower metal acts as cathode

C) Oxidizing power of an element decreases from top to bottom

D) Reducing power of an element decreases from top to bottom

Q.29 **On the electrolysis of aqueous solution of Na_2SO_4 by using inert electrode, which of the following is deposited/released on cathode electrode.**

A) Na is deposited

B) O_2 gas is released

C) Either Na or H_2 is released

D) H_2 gas is released

Q.30 **On the electrolysis of H_2SO_4 (dil) solution by using inert electrode, which of the following is deposited or released at anode electrode**

A) H_2 gas is released

B) O_2 gas is released

C) SO_2 gas is released

D) Either O_2 or SO_2 gas is released

Q.31 **A redox reaction is shown below**

$$C + 4HNO_3\ (con) \rightarrow CO_2 + 4\ NO_2 + 2\ H_2O$$

In this reaction oxidation number of N in nitric acid is decreased from ____ to _____:

A) +5 to +2

B) +5 to +4

C) +3 to + 2

D) + 4 to +2

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ANSWER KEY (Worksheet-6)

1	C	11	B	21	C	31	B
2	A	12	B	22	D		
3	D	13	A	23	D		
4	A	14	A	24	B		
5	D	15	D	25	A		
6	A	16	C	26	C		
7	B	17	C	27	D		
8	C	18	B	28	C		
9	D	19	C	29	D		
10	C	20	D	30	B		

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Worksheet-7

(A. Physical Chemistry)

Chemical Equilibrium

Q.1 **Reversible reaction shows all of the following properties except:**

A) It can proceed in both directions

B) Whole amount of reactant does not change into product

C) Chemical equilibrium can establish in it

D) It is applicable to stoichiometric calculation

Q.2 **Chemical equilibrium is not associated with:**

A) It is macroscopic property

B) At equilibrium the amount of reactant = amount of product

C) It is established in closed system

D) It can establish from either side

Q.3 **If the reaction A + B → AB. If concentration of A and B are doubled the rate of reaction will:**

A) Increases two times

B) Decreases to one half

C) Increases four times

D) Decreases to one

Q.4 **A change in which of these conditions will change the value of Kc at equilibrium.**

A) Temperature

B) Pressure

C) Concentration of reactants

D) Concentration of products are equal

Q.5 **Which of the following principle / rule is applicable at equilibrium?**

A) Law of mass action

B) Pauli's Exclusion Principal

C) Le-Chatelier's Principle

D) Hund's Rule

Q.6 **In which of the following reactions decrease in pressure has no affect in the change of direction of reaction?**

A) $N_2 + O_2 \rightleftharpoons 2NO$

B) $N_2 + 3H_2 \rightleftharpoons 2NH_3$

C) $PCl_5 \rightleftharpoons PCl_3 + Cl_2$

D) $2SO_2 + O_2 \rightleftharpoons 2SO_3$

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Q.7 **In which of the following reaction K_c value has no unit.**

A) $H_2 + I_2 \rightleftharpoons 2HI$

B) $PCl_5 \rightleftharpoons PCl_3 + Cl_2$

C) $N_2 + 3H_2 \rightleftharpoons 2NH_3$

D) $2SO_2 + O_2 \rightleftharpoons 2SO_3$

Q.8 **Consider the following reaction $2SO_2 + O_2 \overset{V_2O_5}{\rightleftharpoons} 2SO_3$ the unit of K_c is:**

A) mol dm^{-3}

B) $mol^{-2}dm^3$

C) $mol^{-1}dm^3$

D) $mol^{-2}dm^6$

Q.9 **In which of the following reaction heterogenous equilibrium is established**

A) $H_2 + I_2 \rightleftharpoons 2HI$

B) $PCl_5 \rightleftharpoons PCl_3 + Cl_2$

C) $N_2 + 3H_2 \rightleftharpoons 2NH_3$

D) $MgCO_3 \rightleftharpoons MgO + CO_2$

Q.10 **Which one of the following statements is correct about a reaction for which the equilibrium constant is independent of temperature?**

A) The activation energies for both forward and reverse reactions are zero

B) The enthalpy change is zero

C) Its rate constants do not vary with temperature

D) There are equal numbers of moles of reactants and products

Q.11 **Which of the following is the strongest acid?**

A) HI

B) HNO_3

C) $HClO_3$

D) H_2SO_4

Q.12 **Which of the following group of elements forms strongest bases?**

A) IVA

B) IIIA

C) IIA

D) IA

Q.13 **Which of the following statement is incorrect?**

A) Strong acid has greater concentration of hydrogen ion

B) Strong acid has low pH value

C) Greater pK_a value, stronger is the acid

D) Smaller is concentration of OH^- ions weaker is the base

Q.14 **Which of the following is not buffer solution?**

A) $CH_3COOH + CH_3COONa$

B) $H_2CO_3 + NaHCO_3$

C) $HCl + NaCl$

D) $H_3PO_4 + Na_2HPO_4$

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Q.15 **If Ka value is 10^{-6} then Kb value is:**

A) 10^{-4}

B) 10^{-8}

C) 10^{-6}

D) 10^{-10}

Q.16 **Which of the following statement is not correct for K_c?**

A) It may or may not have unit

B) It depends on equilibrium concentration

C) It is associated with ΔH

D) It tells us about rate of reaction

Q.17 **All of the following are characteristic features of solubility product EXCEPT?**

A) If solubility is known then K_{sp} can be calculated

B) If K_{sp} is known solubility can be calculated

C) It is applicable if the molar concentration of ions is greater than 0.1M

D) The term K_{sp} is related with reversible process

Q.18 **Which one of the following is a correct statement about the effect of a catalyst?**

A) It increases the equilibrium constant for the forward reaction

B) It increases the rate constant for the forward reaction but not that of the reverse reaction

C) It increases the yield of product at equilibrium

D) It provides an alternative route for a reaction

Q.19 **Water dissociates as shown:**

$$H_2O_{(g)} \rightleftharpoons H^+ + OH^-$$

At 25°C the equilibrium value of $[H^+]$ is 10^{-7} mol dm^{-3}, $[H_2O] = \frac{1000}{18}$ mol m^{-3}. What is the order of increasing numerical value of pH, $_pK_a$ and $_pK_w$ for this equilibrium at this temperature? $[_pK_w = -\log K_w]$

Options	Smallest		Largest
A)	pH	$_pK_a$	$_pK_w$
B)	pH	$_pK_w$	$_pK_a$
C)	pK_a	$_pK_w$	pH
D)	pK_w	$_pK_a$	pH

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Q.20 **In order to get maximum yield of NH_3 all of the following are optical condition EXCEPT?**

A) High pressure

B) Continuous withdrawal of NH_3

C) High temperature

D) Use of catalyst

Q.21 **Which of the following is the Henderson's equation for acidic buffer solution:**

A) $pH=pK_a+\log\frac{[Salt]}{[Acid]}$

B) $pH=K_a+\log\frac{[Salt]}{[Acid]}$

C) $pH=pK_b+\log\frac{[Salt]}{[acid]}$

D) $pH=pK_a-\log\frac{[Salt]}{[Acid]}$

Q.22 **Which of the following statements is incorrect about Henderson's equation for acidic buffer solution:**

A) pH = pKa when [Salt] = [Acid]

B) pH > pKa when [Salt] > [Acid]

C) pH < pKa when [Salt] < [Acid]

D) pH = Ka when [Salt] = [Acid]

Q.23 **The decrease in the solubility of an electrolyte by adding another electrolyte having common ion is called common ion effect. Identify incorrect statement about common ions effect.**

A) It is an application of Le-Chatelier's Principle

B) It is always in the reverse direction

C) The term electrolyte, acid or base is used for it

D) It is used for the purification of a substance

Topic According to NUMS Syllabus

Lewis Definition of Acid and Base, Salt hydrolysis

Q.24 **The phenomenon of interaction of cations and anions of a salt with water in order to produce acidity or alkalinity is known as salt hydrolysis. Which of the following salts is not hydrolyzed:**

A) $CuSO_4$

B) Na_2CO_3

C) Na_2SO_4

D) $AlCl_3$

Q.25 **Which of the following is acidic salt:**

A) Na_2SiO_3

B) $Na_2B_4O_7$

C) K_2SO_4

D) $FeCl_3$

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Q.26 **According to Lewis theory:**

- **Acid is electron pair acceptor**
- **Base is electron pair donor**

All of the following are Lewis acids EXCEPT:

A) H^+ C) BF_3

B) $AlCl_3$ D) PCl_3

Q.27 **Which of the following halide ions is stronger Lewis base:**

A) F^- C) Br^-

B) Cl^- D) I^-

Q.28 **An indicator is a substance which is used to determine the end point of a reaction. All of the following statements are correctly matched regarding indicators EXCEPT:**

Options	Type of Titration	Name of Indicator
A)	Acid base indicators	Phenolphthalein, methyl orange
B)	Redox titration	$K_3Fe(CN)_6$ an internal indicator, $KMnO_4$ an external indicator
C)	Iodimetry titration	Starch indicator
D)	Argentometry	K_2CrO_4

Q.29 **Phenolphthalein is used as an indicator in acid base titration. For which of the following acid base titration it is used as an indicator:**

A) Strong base and strong acid

B) Weak acid and weak base

C) Strong acid and weak base

D) Very weak base and strong acid

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ANSWER KEY (Worksheet-7)

1	D	11	A	21	A
2	B	12	D	22	D
3	C	13	C	23	C
4	A	14	C	24	C
5	C	15	B	25	D
6	A	16	D	26	D
7	A	17	C	27	A
8	C	18	D	28	B
9	D	19	B	29	A
10	B	20	C		

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Worksheet-8

(A. Physical Chemistry)

Reaction Kinetics

Q.1 The change in concentration of reactants or products per unit time is called rate of reaction. The rate of reaction:

A) Increases as the reaction proceeds

B) Decreases as the reaction proceeds

C) Remains the same as the reaction proceeds

D) May decrease or increase as the reaction proceeds

Q.2 With increase of 10°C temperature, the rate of reaction doubles. This increase in rate of reaction is due to:

A) Decrease in activation energy of reaction

B) Decrease in the number of collision between molecule of reactants

C) Increase in activation energy of molecule of reactants

D) Increase in number of effective collision

Q.3 The minimum amount of energy required for an effective collision is called activation energy. Which of the following statements is incorrect about Ea? Ea=Activation energy K=Specific rate constant

A) Ea of exothermic reaction in the forward reaction is less than that of backward reaction

B) Ea of endothermic reaction in the forward direction is greater than that of reverse reaction

C) Ea is directly proportional to k

D) Ea is independent of temperature

Q.4 Order of reaction is the number of reacting molecules whose concentration alters as a result of chemical change. For which order of reaction the unit of rate constant (k) is the same as that of rate of reaction?

A) 1^{st} order reaction

B) Zero order reaction

C) 2^{nd} order reaction

D) 3^{rd} order reaction

Q.5 Which of the following statements about order of reaction is incorrect?

A) It determines mechanism of reaction

B) It is determined experimentally

C) It is associated with rate equation

D) It is always equal to molecularity

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Q.6 **In which of the following order of reaction the half-life is independent of initial concentration?**

A) Zero order
B) 2nd order
C) 1st order
D) 3rd order

Q.7 **All of the following factors affect rate of reaction EXCEPT:**

A) Concentration of reactants
B) Molecularity
C) Catalyst
D) Temperature

Q.8 **The addition of catalyst to a reaction.**

A) Can change the enthalpy
B) Can change the entropy
C) Can change the nature of products
D) Can change the activation energy

Q.9 **The experimental relationship between rate of reaction and concentration of reactant is called:**

A) Rate Law
B) Law of mass action
C) Hess's Law
D) Le-Chateliar's principle

Q.10 **The specific rate constant is equal to rate of reaction when concentration of reactants are taken as unity. Which of the following factors affect specific rate constant?**

A) Concentration of reactant
B) Pressure
C) Temperature
D) Surface area

Q.11 **A reaction in which catalyst is used is called catalysis. Which of the following is an example of heterogeneous catalysis?**

A) $2SO_2 + O_2 \overset{V_2O_5}{\rightleftharpoons} 2SO_3$

B) $CH_3COOH + C_2H_5OH \overset{H^+}{\rightleftharpoons} CH_3COOC_2H_5 + H_2O$

C) $SO_2 + O_2 \overset{NO}{\rightleftharpoons} 2SO_3$

D) $2KClO_3 \overset{MnO_2}{\rightleftharpoons} 2KCl + 3O_2$

Q.12 **Half life cycle of an order of reaction is inversely proportional to initial concentration raised to the power one less than order of reaction. For which of the following half life of an order of reaction is inversely proportional to the initial concentration of reaction:**

A) Zero order
B) 1st order
C) 2nd order
D) 3rd order

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Q.13 **If the reaction $P+Q \longrightarrow R+S$ is described as being of zero order w.r.t to P. It means that:**

A) P is a catalyst in this reaction

B) P molecules do not possess sufficient energy to react

C) The concentration of P does not change during the reaction

D) The rate of reaction is independent of concentration of P

Q.14 **The hydrolysis of $(CH_3)_3CCl^-$ by OH^- ion proceed in two steps.**

$$R = (CH_3)_3C -$$

$$RCl \overset{Slow}{\rightleftharpoons} R^+ + Cl^-$$

$$R^+ + OH^- \overset{Fast}{\rightleftharpoons} R - OH$$

Which of the following rate equation is consistent with this mechanism of reaction?

A) rate = $k[RCl]^2$

B) rate = $k\,[RCl]\,[OH^-]^2$

C) rate = $k[RCl]\,[OH^{-1}]$

D) rate = $k\,[RCl]$

Q.15 **Which one of the following correctly represents the units of the rate constant k for a first order reaction?**

A) s^{-1}

B) $mol.dm^{-3}s^{-1}$

C) $mol\ dm^{-3}s$

D) $mol^{-1}dm^3s$

Q.16 **If the rate of decay of a radioactive isotope decreases from 200 counts per minutes to 25 counts per minute after 24 hours. What is half life?**

A) 3 hours

B) 6 hours

C) 4 hours

D) 8 hours

Q.17 **Considered the general reaction nA $\longrightarrow$ Product. The rate of equation for a reaction is given by rate of reaction = $k\,[A]^n$. If the value of n = 3. Then the unit of k for the 3rd order of reaction is?**

A) $mol\ dm^{-3}s^{-1}$

B) $mol^{-2}dm^6s^{-1}$

C) $mol^{-1}dm^3s^{-1}$

D) $mol^{-1}s^{-1}$

Q.18 **For the gaseous reaction $2X + Y \rightarrow X$.**

$$rate = k[X]^2[Y]^0.$$

If the pressure in the reaction vessel is doubled but temperature remains constant. By what factor does the rate of reaction increases?

A) 2

B) 8

C) 3

D) 4

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Q.19 **A radioactive element has two isotopes, G and H, with half lives of 5 min and 15 min respectively. An experiment starts with 4 times as many atoms of G as of H. Radioactive decay is a first order reaction. How long will it be before the number of atoms of G left equal the number of atoms of H left?**

A) 5 min
B) 10 min
C) 15 min
D) 20 min

Q.20 **The half-life of any order of reaction is inversely proportional to the initial concentration. (a) raised to the power one less than the order of reaction:**

$$\left(t_{1/2}\right)_n \propto \frac{1}{a^{n-1}}$$

Which of the following mathematical expression is true for the half-life period of second order reaction?

A) $\left(t_{1/2}\right)_1 \propto a^{\circ}$
B) $\left(t_{1/2}\right)_2 \propto \frac{1}{a^1}$
C) $\left(t_{1/2}\right)_3 \propto \frac{1}{a^3}$
D) $\left(t_{1/2}\right)_3 \propto \frac{1}{a^2}$

Q.21 **All of the following are characteristics features of catalyst EXCEPT:**

A) It speeds up a chemical reaction
B) It is used in smaller amount
C) It can initiate a chemical reaction
D) Enthalpy change of a catalyzed and uncatalyzed reaction is not same

Q.22 **In some of the reaction, a product formed act a catalyst, this phenomenon is called:**

A) Auto catalysis
B) Enzyme Catalysis
C) Negative catalysis
D) Poisoning of a catalyst

Q.23 **Identify the incorrect statement about enzyme catalysis:**

A) It is highly specific in action
B) Its activity is increased by the presence of activator
C) It shows maximum rates of reaction at minimum temperature
D) Its catalyst activity is inhibited by a poison

Q.24 **A solution A of concentration 0.10 mol dm^{-3} undergoes first order reaction at an initial rate of 5.0 x 10^{-4} mol dm^{-3} s^{-1}. The value of rate constant for this is:**

A) 2 x 10^{-3} s^{-1}
B) 3 x 10^{-3} s^{-1}
C) 4 x 10^{-3} s^{-1}
D) 5x 10^{-3} s^{-1}

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ANSWER KEY (Worksheet-8)

1	B	11	A	21	D
2	D	12	C	22	A
3	C	13	D	23	C
4	B	14	D	24	D
5	D	15	A		
6	C	16	D		
7	B	17	B		
8	D	18	D		
9	A	19	C		
10	C	20	B		

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Worksheet-10

(B. Inorganic Chemistry)

Transition Elements

Q.1 **Which of the following is correct formula for general electronic configuration of d-block elements:**

A) $(n-1)d^{1-10}\ ns^{1-2}$

B) $(n-1)d^{10}\ ns^{2}$

C) $(n-1)d^{1-5}\ ns^{1-2}$

D) $(n-1)d^{1-10}\ ns^{2}$

Q.2 **All of the following transition elements show variable oxidation state EXCEPT:**

A) Fe

B) Cr

C) Zn

D) Cu

Q.3 **Mark the incorrect statement about transition elements of 3d series:**

A) All the elements show +2 oxidation state

B) They show variable oxidation because of the involvement of the unpaired d-electrons in addition to s-electrons

C) Fe^{+3} ion is more stable than Fe^{+2} ion

D) First four elements in the highest oxidation state use all of the s and d electrons for bonding

Q.4 **Which of the following is the correct electronic configuration of gold (atomic number of Au = 79):**

A) $[_{54}Xe]4f^{14}5d^{10}6s^{1}$

B) $[_{54}Xe]4f^{14}5d^{9}6s^{1}$

C) $[_{54}Xe]4f^{14}5d^{9}6s^{2}$

D) $[_{54}Xe]4f^{14}5d^{10}6s^{2}$

Q.5 **Transition elements show all of the following characteristics properties EXCEPT:**

A) They are good conductor of heat and electricity

B) Those metals which form coloured compounds have at least one unpaired electron in d-sub shell

C) Their ions and compounds are coloured in solid state only

D) They act as a catalyst

Q.6 **Which of the following complex ion shows tetrahedral geometry:**

A) $[MnCl_4]^{-2}$

B) $[Cu(NH_3)_4]^{+2}$

C) $[Fe(CN)_6]^{-4}$

D) $[PtCl_6]^{-2}$

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Q.7 **Transition elements mostly show _____ geometry:**

A) Linear
B) Trigonal bipyramid
C) Square planar
D) Octahedral

Q.8 **Correct name of $[Pt(OH)_2(NH_3)_4]SO_4$ is:**

A) Tetraamminedihydroxo platinum (IV) sulphate
B) Dihydrozo tetra-ammine Pt (V) sulphate
C) Tetra-ammine dihydroxo platinum (II) sulphate
D) Dihydrozo tetra-ammine Pt (IV) sulphate

Q.9 **Which of the following transition elements has maximum number of unpaired electron in its ground state:**

A) Mn
B) Cr
C) Fe
D) Ni

Q.10 **In copper sulphate pentahydrate ($CuSO_4.5H_2O$), the number of water molecules attached with Cu^{+2} ion through coordinate covalent bond is:**

A) 2
B) 3
C) 4
D) 5

Q.11 **In $[Ti(H_2O)_6]^{3+}$, _____ light is absorbed, while most of the blue and red lights are transmitted, therefore the solution of $[Ti(H_2O)_6]^{3+}$ ions looks violet in colour:**

A) Yellow
B) Green
C) Blue
D) Red

Q.12 **The catalysts used for the following processes are correctly matched EXCEPT:**

Options	Catalysts	Processes	Used to prepare
A)	Fe	Haber's process	NH_3
B)	V_2O_5	Contact process	H_2SO_4
C)	Co	Catalytic oxidation of methane	HCOOH
D)	Pt + Rh	Ostwald's methods	HNO_3

Q.13 **3d-series of transition elements contain elements in the range:**

A) Sc ----- Zn
B) La ----- Hf
C) Y ----- Cd
D) Ce ----- Lu

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Q.14 **Which of the following d-block elements shows the highest oxidation state in its compounds:**

A) Cr
B) Cu
C) Mn
D) Fe

Q.15 **Which of the following transition metal ions has three unpaired electrons in 3d sub-shell:**

A) Al^{+3}
B) Sc^{+3}
C) Mn^{+2}
D) Cr^{+3}

Q.16 **The number of lone pair of electrons provided by the ligands to the central metal atom or ion is called:**

A) Oxidation number
B) Coordination number
C) Effective atomic
D) Coordination complex

Q.17 **All of the following are monodentate ligands EXCEPT:**

A) OH^-
B) CN^-
C) CO
D) N_2H_4

Q.18 **Geometry of the transition elements depends upon type of orbital hybridization. Which of the following type of orbital hybridization shows trigonal bipyramidal geometry:**

A) sp^3
B) dsp^2
C) dsp^3
D) d^2sp^3

Q.19 **All the elements of 3d-series show correct electronic configuration EXCEPT:**

Options	Elements	Electronic configuration
A)	$_{22}Ti$	$(Ar)3d^24s^2$
B)	$_{29}Cu$	$(Ar)3d^94s^2$
C)	$_{24}Cr$	$(Ar)3d^54s^1$
D)	$_{25}Mn$	$(Ar)3d^54s^2$

Q.20 **All of the following first row of the transition elements (3d-series) show the most common oxidation states. Mark the incorrect statement:**

Options	Elements	Most common oxidation states
A)	Ti	+3,+4
B)	V	+2,+3,+4,+5
C)	Mn	+3,+5,+6,+7
D)	Fe	+2,+3

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Topic According to NUMS Syllabus (Different From UHS Syllabus)
Introduction, General Features, Coordination Compounds and Properties of Transition Elements

Q.21 Which of the following elements are used as a catalyst in the chemical reactions:

A) Alkali metals

B) Transition elements

C) Alkaline earth metal

D) Element which form border line compounds

Q.22 Elements of 3d-series generally show which of the following stable oxidation states:

A) +1, +2

B) +2, +3

C) +4, +5

D) +6, +7

Q.23 All of the following are typical transition elements EXCEPT:

A) Cr

B) Fe

C) Cu

D) Zn

Q.24 Transition elements show all of the following properties EXCEPT:

A) They are all metals in true sense

B) They show variable oxidation state

C) They have high melting and boiling points

D) Their ionization energy is less than that of IIA group elements

Q.25 Which of the following statement is correct about covalent radii in 3d-series of transition elements:

A) It decreases continuously

B) First it decreases then increases rapidly

C) First it decreases in the start, constant in the middle and then increases at the end of series

D) It remains almost constant in the series

Q.26 In moving from left to right in any transition series, the number of unpaired electrons increases upto groups:

A) IIB and IIIB

B) IVB and VB

C) VB and VIB

D) VIB and VIIB

Q.27 Which groups of transition elements are known as non-typical transition element:

A) IIB and IIIB

B) IB and IVB

C) IVB and VB

D) VIB and VIIB

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ANSWER KEY (Worksheet-10)

1	A	11	A	21	B
2	C	12	C	22	B
3	D	13	A	23	D
4	A	14	C	24	D
5	C	15	D	25	C
6	A	16	B	26	A
7	D	17	D	27	A
8	A	18	C		
9	B	19	B		
10	C	20	C		

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(B. Inorganic Chemistry)
Elements of Biological Importance

Q.1 **All of the following are the causes of inertness of nitrogen gas EXCEPT:**

A) Smaller size
B) High bond order
C) Low dissociation constant
D) d-subshell is absent

Q.2 **Which of the following is raw material for the preparation of ammonia (NH_3):**

A) Hydrogen gas only
B) Nitrogen gas only
C) Both A and B
D) Neither A nor B

Q.3 **All of the following are physical properties of NH_3 gas EXCEPT:**

A) It is colourless gas with pungent odour
B) It is lighter than air
C) When it is inhaled suddenly, it brings tears into the eye
D) It can be liquefied at STP by applying a pressure of above 12 – 15 atmosphere

Q.4 **Ammonia has all of the following uses EXCEPT:**

A) It is used to prepare nitric acid by Birkeland and Eyde process
B) It is used in the manufacture of urea and rayon
C) It is used as a refrigerant in ice plants
D) It is used in the manufacture of Na_2CO_3 by Solvay's process

Q.5 **The second most widely used fertilizer in Pakistan is:**

A) Potassium nitrate
B) Ammonium nitrate
C) Diammonium phosphate
D) Urea

Q.6 **Mark the incorrect statement about SO_2:**

A) It is colorless gas with irritating smell
B) It can act as oxidizing agent as well as reducing
C) It act as amphoteric oxide
D) It acts as a temporary bleaching agent

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Q.7 **All of the following fertilizers have correctly matched statement EXCEPT:**

Options	Name of fertilizer	%age of nitrogen
A)	Urea	46
B)	Diammonium phosphate	14
C)	Ammonium nitrate	33 – 33.5
D)	Liquid ammonia	82

Q.8 **SO_3 crystals on warming change directly to a gas. This is called:**

A) Diffusion
B) Sublimation
C) Evaporation
D) Decomposition

Q.9 **Which one is incorrect about $H_2S_2O_7$:**

A) It is obtained by dissolution of SO_3 in water
B) It is obtained by dissolution of SO_3 in conc. H_2SO_4
C) It is called oleum acid
D) It contain one O-O bond in its molecule

Q.10 **All of the following are properties of good fertilizers EXCEPT:**

A) It is readily available to plants
B) It is not injurious to plants
C) It is soluble in water
D) It can change pH of the soil

Q.11 **Which of these is not a property of dilute sulphuric acid?**

A) It is an electrolyte
B) It reacts with some metals to give off hydrogen gas
C) Its salts called sulphate are always soluble in water
D) It contains ions

Q.12 **All of the following properties shown by nitrogen and other elements of group VA are correct EXCEPT:**

Options	Nitrogen	Other elements
A)	(N_2) Gas	Solid
B)	Diatomic ($N \equiv N$)	Tetra atomic molecules
C)	Has no allotropic form	Have allotropic forms
D)	Low ionization energy	High ionization energy

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Q.13 **Identify the property which is not shown by sulphuric acid:**

A) It is also called oil of vitrol

B) It is manufactured by contact process

C) The purification unit consists of scrubbers (dust removal, moisture remover) and arsenic purifier

D) It acts as a food preservative

Q.14 **Which of these is not the use of SO_2:**

A) It is the most culprit pollutant

B) In solution form it causes acid rain

C) It acts as a food preservative

D) It is a permanent bleaching agent

Q.15 **All of the following are anhydrides of respective acids EXCEPT:**

Options	Acids	Anhydrides
A)	H_2SO_4	SO_3
B)	HNO_3	N_2O_5
C)	H_3PO_4	P_2O_3
D)	$HClO_4$	Cl_2O_7

Q.16 **All of the following are uses of SO_2 gas EXCEPT:**

A) It is used as oxidizing agent only

B) It acts as food preservative

C) It is used to prepare H_2SO_4

D) It is used as temporary bleaching agent

Q.17 **All of the following are the optimum conditions in order to get maximum yield of SO_3 by contact process EXCEPT:**

A) High pressure (1atm)

B) Catalyst V_2O_5 or Ni

C) Low temperature (400 – 500°C)

D) Continuous withdrawal of SO_3 after intervals

Q.18 **Which of the following fertilizer is not useful for paddy rice:**

A) Urea

B) Ammonia in liquid form

C) Ammonium nitrate

D) Ammonium phosphate

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Q.19 When sulphuric is treated with glucose it acts as:

A) Drying agent
C) Dehydrating agent
B) Oxidizing agent
D) Reducing agent

Q.20 Sulphuric acid (H_2SO_4) is commercially prepared by contact process. All of the following purification units with their functions are correctly matched EXCEPT:

Options	Purification units	Uses
A)	Dust remover	Dust particles are removed from gases by steam wash
B)	Scrubber	Soluble impurities are removed by water
C)	Conc. H_2SO_4	As drying agent to remove moisture
D)	Arsenic purifier	$Fe(OH)_2$ is to remove AsO_3 as impurity

Q.21 All of the following elements are macronutrients EXCEPT:

A) N
C) Ca
B) S
D) Mn

Q.22 Which of the following is pair of oxides of non-metals are the major cause of acid rain:

A) CO, NO_2
C) CO_2, SO_2
B) SO_2, NO_2
D) NO_2, O_2

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ANSWER KEY (Worksheet-11)

1	D	11	C	21	D
2	C	12	D	22	B
3	D	13	D		
4	A	14	D		
5	B	15	C		
6	C	16	A		
7	B	17	B		
8	B	18	C		
9	A	19	C		
10	D	20	D		

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Worksheet-12

(C. Organic Chemistry)

Fundamental Principles

Q.1 **All of the following are aromatic (benzenoids) compounds EXCEPT:**

A) Phenol

B) Vinyl alcohol

C) Benzyl alcohol

D) Anisole

Q.2 **Organic compounds have all of the following properties EXCEPT:**

A) They have low melting points

B) Their solutions are non-conductor

C) They show isomerism

D) They are non-flammable

Q.3 **All of the following are polar molecules EXCEPT:**

A) $CHCl_3$

B) CH_3COCH_3

C) CCl_4

D) HCOH

Q.4 **In homolytic fission each of the atoms acquires one of the bonding electrons when covalent bond is broken. This type o fission shows all of the following characteristic properties EXCEPT:**

A) Produces free radicals

B) Reaction takes place rapidly

C) Initiated by polar solvent

D) Both A and B

Q.5 **All of the following are examples of heterocyclic compounds EXCEPT:**

A) Pyrrole

B) Catechol

C) Furan

D) Thiophene

Q.6 **All of the following are nucleophiles EXCEPT:**

A) R_3C^+

B) $R - CH_2^-$

C) CN^-

D) NH_3

Q.7 **Which of the following is electrophile:**

A) Cl^-

B) BF_3

C) H_2O

D) NH_2^-

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Q.8 Which of the following hydrocarbon is the most reactive

A) Alkane
C) Alkene
B) Alkyne
D) Benzene

Q.9 In geometric isomerism, the cis-isomers have all of the following properties EXCEPT:

A) They are polar molecules
B) They have high boiling points
C) They are symmetrical molecules
D) They have low melting points

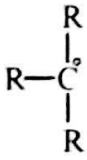
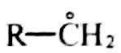
Q.10 All of the following organic compounds show geometric isomerism EXCEPT:

A) 2-Butene
C) 2-Pentene
B) 3-Hexene
D) 1-Butene

Q.11 Which of the following are basic conditions for geometric isomerism:

A) Having Carbon – Carbon double bond
B) Different groups are attached with carbon containing double bond
C) Double bond involves free rotation
D) Both A and B

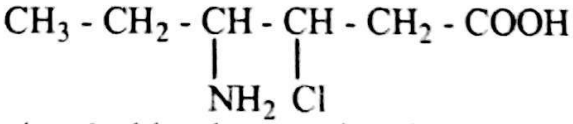
Q.12 Which of the following is the most stable free radical:

A) 
C)
B) 
D)

Q.13 Which of the following is the least stable carbocation:

A) Me_3C^+
C) Me_2CH^+
B) CH^+_3
D) $MeCH_2^+$

Q.14 The correct of the following structure according to IUPAC of the given structure is:



A) 4-Amino-3-chlorohexaneoic acid
B) 3-Amino-4-chlorohexaneoic acid
C) 4-Amino-5-chlorohexaneoic acid
D) 2-Amino-3-chlorohexaneoic acid

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Q.15 Which of the following type of cracking (pyrolysis) is used to increase production of petrol:

A) Thermal cracking
B) Catalytic cracking
C) Electrolytic cracking
D) Steam cracking

Q.16 Consider the following condensed formula of alkane:

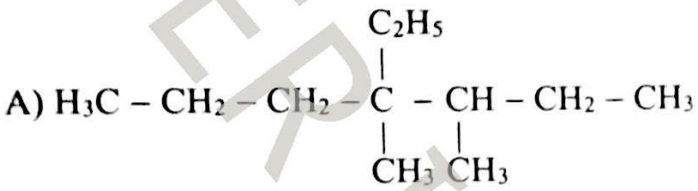
$$(CH_3)_2CH(CH_2)\text{-}C(CH_3)_3$$

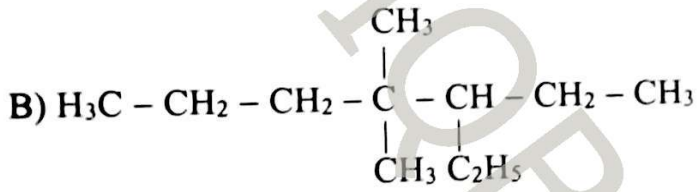
Correct name of above formula is:

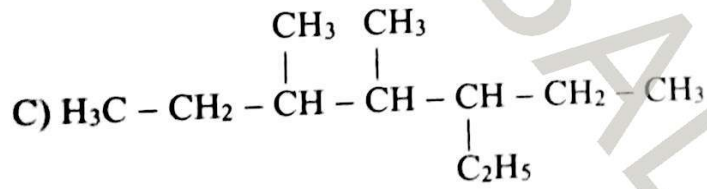
A) 2,3,4-Trimethyl pentane
B) 2,6,6-Trimethyl pentane
C) 2,4,4-Trimethyl pentane
D) 2,2,4-Trimethyl pentane

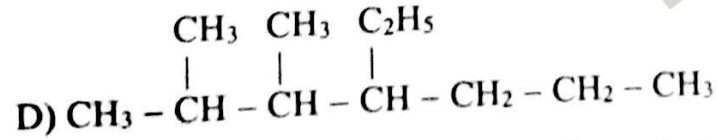
Q.17 The structural formula of the following compound is:

4-Ethyl-3,4-dimethyl heptane is:

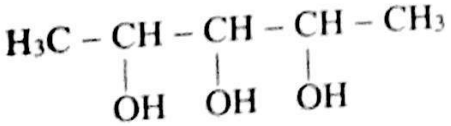
A)


B)


C)


D)


Q.18 Consider the following structural formula of alcohol:



The correct name of above formula according to IUPAC is

A) 1,2,3-Propanetriol
B) 1,2,3-Propantriol
C) Propane-2,3,4-triol
D) Propylene-1,2,3-triol

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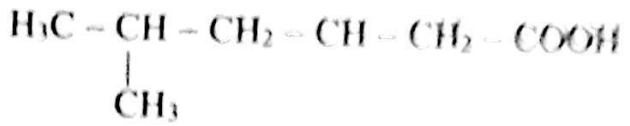
Q.19 **Consider the following structural formula of carboxylic acid:**



The correct name according to IUPAC is:

A) 5-Methyl hexanoic acid
B) 2-Methyl hexanoic acid
C) 2-Methyl-5-hexanoic acid
D) 5-Methyl valeric acid

Q.20 **The correct name according to IUPAC of the following alkene is:**

A) 1,3-Pentadiene
B) 2,4-Pentadiene
C) 2,3-Pentadiene
D) 1,4-Pentadiene

Q.21 **An atom or a group of atoms or a double bond or triple bond whose presence imparts specific properties to organic compounds is called a functional group, because they are the chemically functional parts of molecules:**

Which of the following is functional group of carboxylic acid:

A) -COOH
B) -OH
C) $-CONH_2$
D) -CHO

Q.22 **Like all chemical reactions organic reaction involve the breaking and making of chemical bonds there are two ways in which covalent bonds can break i.e. hemolytic and heterolytic fission. Heterolytic fission shows all of the characteristics features EXCEPT:**

A) It produces ions
B) Its rate of reaction can be measured
C) It is initiated by polar solvent
D) It produces free radicals as well

Q.23 **The homocyclic compounds which contain a ring of three or more carbon atoms are called alicyclic compounds. Which of the following are example of alicyclic compounds except:**

A) Benzene
B) Pyridine
C) Toluene
D) Cyclopentene

Q.24 **Which of the following class of organic compounds contains ring which has more than one kind of atoms.**

A) Aromatic
B) Heterocyclic
C) Non-benzenoid
D) Aliphatic

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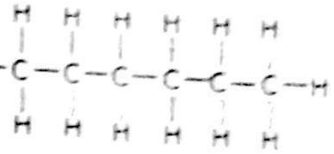
Topic According to NUMS Syllabus (Different From UHS Syllabus) Representing Molecule, Bonding On Organic Molecule And Organic Reaction Mechanism

Q.25 Which of the following is skeletal formula of hexane:

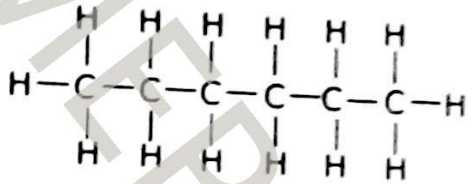
A) C_6H_{14}

C)

B) $H_3C - CH_2 - CH_2 - CH_3$

D) 

Q.26 Which of the following is structural formula of pentane:

A) 

B) $H_3C - CH_2 - CH_2 - CH_2 - CH_3$

C) $H_3C(CH_2)_3CH_3$

D)

Q.27 A reaction which results in the removal of a small molecule from a large one is called:

A) Addition reaction

C) Substitute reaction

B) Elimination reaction

D) Oxidation reaction

Q.28 All of the following terms represent an organic molecule EXCEPT:

A) Molecular formula

C) Skeletal formula

B) Structural formula

D) Ionic formula

Q.29 Mark the incorrect statement about gasoline:

A) Greater is octane number better is the quality of petrol

B) Quality of petrol is increased by reforming

C) Production of petrol is increased by cracking

D) If octane number of petrol is 60 it is considered good quality of petrol

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ANSWER KEY (Worksheet-12)

1	B	11	D	21	A
2	D	12	A	22	D
3	C	13	B	23	C
4	D	14	A	24	B
5	B	15	B	25	C
6	A	16	D	26	B
7	B	17	A	27	B
8	C	18	C	28	D
9	C	19	A	29	D
10	D	20	A		

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Worksheet-13

(C. Organic Chemistry)

Hydrocarbons

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Q.1 **The reaction of chlorine with methane is carried out in the presence of sunlight. What is the function of the light:**

A) To break the C - H bonds in methane

B) To break up the chlorine molecules into free radicals

C) To heat up the mixture

D) To break up the chlorine molecules into ions

Q.2 **Methane when burnt in the presence of metallic catalyst (Cu), at high temperature (400°C) and pressure (200atm). Which of the following is the ultimate product:**

A) Methanol

B) Ethanal

C) Methanal

D) Methanoic acid

Q.3 **Chlorination of methane is believed to proceed through free radical mechanism. Which of the following is propagation step:**

A) $Cl - Cl \xrightarrow{h_2} 2Cl^{\circ}$

B) $CH_3^{\cdot} + Cl_2 \longrightarrow CH_3 - Cl + Cl^{\circ}$

C) $CH_3 + HCl \longrightarrow H_3C - Cl + H^{\circ}$

D) $H_3C^{\circ} + C^{\circ}H_3 \longrightarrow H_3C - CH_3$

Q.4 **Nitrobenzene maybe prepared by reacting benzene with a mixture of concentration H_2SO_4 and concentration HNO_3 at 55°C. Which of the following best explains the role of concentration H_2SO_4:**

A) Removes the water produced

B) Forms on unstable complete with benzene

C) Protonating nitric acid

D) Acting as a solvent

Q.5 **Benzene reacts with acetyl chloride in presence of catalyst $AlCl_3$ to give:**

A) Aldehyde

B) Acetophenone

C) Benzyl Chloride

D) Benzophenone

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Q.6 **β-elimination is competitive to nucleophilic substitution reaction. It has all of the following conditions for reaction as compared to nucleophilic substitution reaction EXCEPT:**

A) It takes place in the presence of less polar solvent (like alcohol)

B) It takes place at high temperature

C) It requires strong nucleophile (base)

D) It takes place at low temperature

Q.7 **All of the following are dehydrating agents EXCEPTS:**

A) SiO_2

B) Conc. H_2SO_4

C) Al_2O_3

D) H_3PO_4

Q.8 **Which of the following is correct order of ease of dehydration of alcohols:**

A) 1 ° alcohol > 2 ° alcohol > 3 ° alcohol

B) 3 ° alcohol > 2 ° alcohol > 1 ° alcohol

C) 2 ° alcohol > 1 ° alcohol > 3 ° alcohol

D) 3 ° alcohol > 1 ° alcohol > 2 ° alcohol

Q.9 **Which of the following tests is not used to distinguish between alkanes and alkenes:**

A) Baeyar's test

B) $Br_2(CCl_4)$

C) $Cl_2(Cl_4)$

D) Tollen's test

Q.10 **A hydrocarbon, which is a liquid at room temperature, decolourize aqueous bromine. Which could be the molecular formula of the compound:**

A) C_2H_2

B) C_2H_4

C) C_7H_{16}

D) $C_{10}H_{20}$

Q.11 **Which of the following alkenes does not follow Markonikov's rule:**

A) 1-Pentene

B) 1-Butene

C) 1-Hexene

D) 2-Butene

Q.12 **Aromatic compounds burn with sooty flame because:**

A) They have high percentage of hydrogen

B) They have a ring structure

C) They have high percentage of carbon

D) They resist reaction with air

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Q.13 Alkanes are used as fuels. We burn them for many reasons. Which of the following is not its use:

A) They are used to generate electricity in power stations

B) They are used to heat our homes and cook our food

C) They are used to provide electricity for electrolytic cell

D) They are used to provide electricity for galvanic cell

Q.14 Consider the following reaction:

$$H_2C = CH_2 + HBr \rightarrow H_3C - CH_2Br$$

The mechanism of reaction is:

A) Nucleophilic addition reactions

B) Electrophilic addition reaction

C) Free radical substitution

D) Nucleophilic substitution reaction

Q.15 Which property of benzene may be directly attributed to the stability associated with its delocalized electrons:

A) It has a low boiling point

B) Its enthalpy change formation (ΔH_f) is positive

C) It is susceptible to attack by nucleophilic reagent

D) It tends to undergo electrophilic substitution rather addition reactions

Q.16 Among the followings the compound that can be most readily nitrated is:

A) Benzoic acid

B) Benzene

C) Phenol

D) Chlorobenzene

Q.17 When toluene is treated with chlorine in the presence of sunlight, which of the following is ultimate product:

A) Benzyl chloride

B) Benzotrichloride

C) Benzoyl chloride

D) Benzal dichloride

Q.18 The most important addition reaction of alkenes forms the basis of the plastic industry. Addition polymerization is such process in which smaller molecules (monomers) repeatedly combine to form large molecular having greater molar mass (polymer) as shown:

$$H_2C = CH_2 \xrightarrow[100\ atm.]{400^\circ C} \{H_2C - CH_2\}_n$$

Traces of O_2 (0.1%) $n = 1000$

A good quality polythene is obtained when ethene is polymerized in the presence of.

A) Aluminium triethyl $(C_2H_5)_3$ only

B) Titatinum tetrachloride ($TiCl_4$) only

C) $TiCl_4 + AlCl_3$

D) $TiCl_4 + Al(C_2H_5)_3$

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Q.19 Benzene cannot undergo:

A) Substitution reaction
B) Elimination reaction
C) Addition reaction
D) Oxidation reaction

Q.20 All of the following statements are correct EXCEPT:

A) Introduction of R-group in the benzene ring in the presence of $AlCl_3$ is called alkylation
B) Introduction of acyl group in the benzene ring in the presence of $AlCl_3$ is called acylation
C) Benzene cannot undergo polymerization
D) Ozonolysis of benzene results in the formation of $(COOH)_2$

Q.21 O- and p- directing groups have all the following properties expect:

A) They are electron donating groups.
B) They increase reactivity of mono- substituted benzene ring.
C) They have all lone pair at the central atom of molecules expect alkyl.
D) Halogeno-substituted benzene is more reactive than benzene.

Q.22 All of the following methods explain stability of benzene expect :

A) Resonance energy
B) Resonance method
C) Band theory
D) Atomic orbital treatment

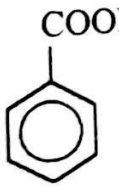
Q.23 When different alkenes are treated with hot concentrated $KMnO_4$ solution, different products are obtained. Which of the following alkene produces two moles of ketone:

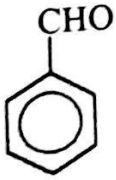
A) $H_2C = CH_2$
B) $R - CH = CH - R$
C) $R^1R^2C = CR^3R^4$
D) $R^1R^2C = CH^3R^4$

Q.24 On the oxidation of toluene by acidified $KMnO_4$ which of the following product is obtained:

A)

B)

C) 

D) 

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Topic According to NUMS Syllabus (Different From UHS Syllabus)
Alkynes and Stereoisomerism (Optical Isomerism)

Q.25 Which of the following methods is used to prepare ethyne on the industrial scale:

A) De-hydrohalogenation of vic-dihalides

B) De-halogenation of tetrahalides

C) Electrolysis of aqueous solution of potassium salt of unsaturated dicarboxylic acids

D) Reaction of calcium carbide with water

Q.26 Kolbe's electrolytic method is used to prepare ethyne. Which of the following salt of carboxylic acid is used for this purpose:

A) Sod-acetate

B) Sodium succinate

C) Sodium oxalate

D) Potassium maleate

Q.27 On oxidation of ethyne with strong alkaline $KMnO_4$ solution, the final product formed is:

A) Glyoxal

B) Glycol

C) Acetic acid

D) Oxalic acid

Q.28 Acetaldehyde is prepared by the reaction of ethyne with water in the presence of $HgSO_4$/ H_2SO_4 at 75 C. Number of steps involved in this reaction is

A) 1

B) 4

C) 2

D) 3

Q.29 When ethyne is treated with ammonical Cu_2Cl_2 solution, then ppt of dicopper acetylide are formed. The colour of ppt is:

A) White

B) Red

C) Yellow

D) Violet

Q.30 When acetylene is passed through a copper tube at 300°C, it polymerizes to:

A) Vinyl acetylene

B) Di-vinyl acetylene

C) Neo-prene

D) Benzene

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Q.31 Consider the following reaction

$$HC \equiv CH + H_2O \xrightarrow[HgSO_4]{dil.\ H_2SO_4} CH_2 = CH - OH \rightleftharpoons B \xrightarrow[[O]]{V_2O_5} C$$

Which of the following is correct sequence for the product shown as: B, C,

A) CH_3CHO, CH_3COOH

B) CH_3COCH_3, CH_3COOH

C) CH_3CH_2OH, CH_3CHO

D) CH_3CHO, CH_3CH_2OH

Q.32 According to atomic orbital benzene all of the following statements are correct about benzene EXCEPT:

A) It shows sp^2-orbital hybridization

B) It is cyclic hexagonal planar structure

C) It has diffused or decolonized electron cloud

D) It has 10 sigma bonds and 6 pi electrons

Q.33 There are two types of isomerism i.e. structural isomerism and stereoisomerism. The two main types of stereoisomerism are: DiaStereomerism (including 'cis-trans isomerism') Optical Isomerism. Each non-superimposable mirror image structure is called a/an:

A) Metamer

B) Elastomer

C) Enantiomer

D) Tautomer

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ANSWER KEY (Worksheet-13)

1	B	11	D	21	D	31	A
2	D	12	C	22	B	32	D
3	B	13	D	23	C	33	C
4	C	14	B	24	C		
5	B	15	D	25	D		
6	D	16	C	26	B		
7	A	17	B	27	B		
8	B	18	D	28	C		
9	D	19	B	29	B		
10	D	20	D	30	D		

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Worksheet-14

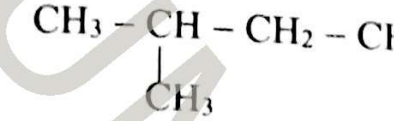
(C. Organic Chemistry)

Alkyl Halides, Alcohols and Phenols

Q.1 **The type of alkyl halides in which halogen is attached with such C-atom which is further attached with two C-atoms are called:**

A) 1° alkyl halides
B) 2° alkyl halides
C) 3° alkyl halides
D) 4° alkyl halides

Q.2 **Consider the following structure formula of alkyl halide:**



The correct name according to IUPAC is:

A) 1-Bromo-4-methylpentane
B) 2-Methyl-5-bromopentane
C) 2-Methylbromopentane
D) 2-Methyl-2-bromopentane

Q.3 **Which of the following is the best method to prepare alkyl halides:**

A) Reaction of alcohol with HCl in the presence of catalyst $ZnCl_2$
B) Reaction of alcohol with PCl_5
C) Reaction of alcohol with PCl_3
D) Reaction of alcohol with $SOCl_2$ in the presence of pyridine solvent

Q.4 **Which of the following alkyl halide cannot be prepared by the direct halogenation of alkanes:**

A) R – Cl
B) R – Br
C) R – I
D) R – F

Q.5 **All of the following are poor leaving group EXCEPT:**

A) NH_2^-
B) HSO_4^-
C) OR^-
D) OH^-

Q.6 **All of the following statements are correct for S_N2 mechanism reaction EXCEPT:**

A) It is bimolecular, 2nd order reaction
B) Order of ease of S_N2 mechanism in alkyl halide is 1° alkyl halide > 2° alkyl halide > 3° alkyl halide
C) It takes place in the presence of polar solvent
D) It involves 100% inversion in the products

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Q.7 Mark the incorrect statement about alkyl halide:

A) Boiling points of haloalkanes is greater than that of alkane Boiling points of alkyl halide is greater than corresponding alkanes

B) Order of decreasing boiling points in alkyl halides

$R - I > R - Br > R - Cl > R - F$

C) Alkyl halides are soluble in water

D) Primary alkyl halides can be prepared by reaction of PCl_5 or $SOCl_2$ on alcohols but not aryl halide

Q.8 Which of the following halide ion (X^-) is good nucleophile and good leaving group:

A) I^- C) F^-

B) Cl^- D) Br^-

Q.9 All of the following properties/uses are shown by alkyl halides EXCEPT:

A) It is colourless liquid with sweet smell

B) Under ordinary conditions it is not flammable

C) It is used as a general anesthetic substance

D) When exposed to air and sunlight, it is not oxidized

Q.10 CCl_4 has all of the following characteristic features EXCEPT:

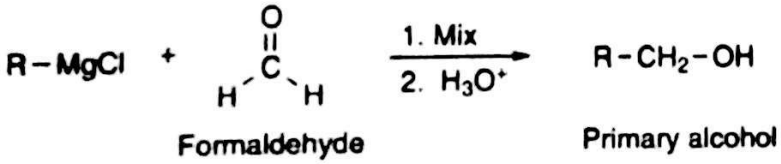
A) It is colourless liquid

B) It is used as industrial solvent

C) It is insoluble in water and soluble in alcohol for fat, oil etc

D) It is inflammable

Q.11 Considered the following reaction of Grignard reagent with carbonyl compound followed by hydrolysis:



Formaldehyde Primary alcohol

The mechanism of reaction before hydrolysis is:

A) Electrophilic addition reaction

B) β-elimination

C) Nucleophilic addition reaction

D) Nucleophilic substitution reaction

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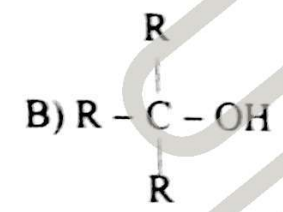
Q.12 Which of the following product is obtained by the reaction of Grignard reagent with ketone followed by hydrolysis:

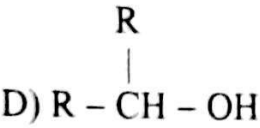
A) 1° alcohol
B) 2° alcohol
C) 3° alcohol
D) Both B and C

Q.13 Which of the following type of alcohols is the most reactive when bond is to be broken between carbon and oxygen atom:

A) R – OH

B) 

C) R – CH_2 – OH

D) 

Q.14 In which of the following reactions, the bond has been broken between oxygen and hydrogen in case of alcohols:

A) $2CH_3 - 6H_2 - OH + 2Na \longrightarrow H_3C - CH_2 - O^- Na^+ + H_2$

B) $3CH_3 - CH_2 - OH + PCl_3 \longrightarrow CH_3 - CH_2 - Cl + H_3PO_3$

C) $H_3C - CH_2 - OH + SoCl_2 \xrightarrow{pyridine} CH_3 - CH_2 - Cl + SO_2 + HCl$

D) $CH_3 - CH_2 - OH + PCl_5 \longrightarrow CH_3 - CH_2 + PCl + HCl$

Q.15 Which of the following tests helps us to distinguish between methanol and ethanol:

A) Lucas test
B) Iodoform test
C) Tollen's test
D) Baeyer's test

Q.16 Which of the following does not correctly match. All of the following are correctly matched EXCEPT:

Options	Carbohydrates	Hydrolysis	Product
A)	Sucrose	//	Glucose + fructose
B)	Maltose	//	Glucose (two molecules)
C)	Glucose	//	Ethanol only
D)	Lactose	//	Glucose + galactose

Q.17 Which of the following is the weakest acid:

A) Carboxylic acid
B) Ethanol
C) Phenol
D) Ethyne

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Q.18 All of the following statement about phenol and ethanol are correctly matched EXCEPT:

Options	Properties	Phenol	Ethanol
A)	Bromination (Br_2/H_2O)	White ppt of 2,4,6-Tribromo phenol	No reaction
B)	H_2/Ni	No reaction	No reaction
C)	Action of organic acid	No reaction	Formation of ester
D)	Iodoform test	No white ppt	Yellow ppt of CHI_3

Q.19 Which of the following raw material is/are used to prepared ethyl alcohol:

A) Starch only
C) Both A and B
B) Molasses only
D) Neither A nor B

Q.20 Which of the following drying agent is used to get absolute alcohol from rectified sprit:

A) Conc. H_2SO_4
C) Al_2O_3
B) CaO
D) H_3PO_4

Q.21 Identify the incorrect statement about the use of chloroform:

A) It is use as an anesthetic substance

B) It is use as a solvent for fats waxes and resins

C) It is use in manufacturing freons

D) It is use as preservative for anatomical specimen

Q.22 All of the following are characteristics features of Teflon plastic EXCEPT:

A) It is valuable plastic which exist the action of acid and alkal:

B) It is use for coating the electrical wiring

C) It is use as a non-stick coating for cooking pans

D) It reacts with oxidants

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Q.23 All of the following are side effect of halothane EXCEPT:

A) It is a potent anesthetic substance

B) Repeated explorer to halothane causes liver injury

C) It is not a good analgetic

D) It sensitizes the heart to catechloamines, so it is liable to cause cardiac arrhythmias

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Q.24 Which of the following is the most dangerous factor which damage ozone:

A) Aerosol spray

B) Use of chlorofluorocarbons

C) Effect of SO_2 and NO_2 pollutant

D) Global warming by CO_2

Q.25 In halothane ($CF_3CHClBr$) every halogen has specific function which is incorrect about halogen:

A) Fluorine atoms are introduced in it to make it non-flammable

B) The bromine atom is introduced to increase its boiling point

C) The chlorine atom is introduced for its anesthetic action

D) Fluorine atoms are introduced in it to make it more volatile

Q.26 In which of the following reaction alcohol is produced:

A) Reaction of alkyl halide with aqueous KOH

B) Reaction of alkyl halide with alcoholic KOH

C) Reaction of alkyl halide with KCN followed by acidic hydrolysis

D) Reactions of alkyl halide with sodium alkoxide

Q.27 The type of monohydro alcohol in which –OH group is attached with such carbon atom which is further attached with to carbon and one hydrogen atom is called:

A) 1° alcohol

B) 2° alcohol

C) 3° alcohol

D) Absolute alcohol

Q.28 Which of the following is type of alcohol on oxidation with acidified potassium dichromate gives aldehyde:

A) 1° alcohol

B) 2° alcohol

C) 3° alcohol

D) Neo alcohol

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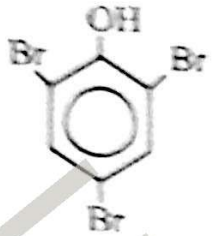
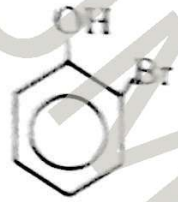
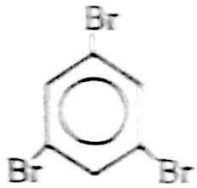
Q.29 Aqueous phenol decolorizes bromine water to form a white precipitate. What is the structure of the white precipitate formed?

A) 

B) 

C)

D) 

Q.30 When phenol is treated with concentrated nitric acid at high temperature. Which of the following product is obtained :

A) o-nitro phenol
B) p-nitro phenol
C) m-nitro phenol
D) 2,4,6-nitro phenol

Q.31 Which of the following reaction show that phenol act as an acid:

A) Reaction with conc. nitric acid
B) Reaction with bromine
C) Reaction with $NaOH_4$
D) Reaction with H_2

Q.32 Which of the following is stronger acid:

A) Carboxyl acid
B) Phenol
C) Water
D) Alcohol

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ANSWER KEY (Worksheet-14)

1	B	11	C	21	C	31	C
2	A	12	C	22	D	32	A
3	D	13	B	23	A		
4	C	14	A	24	B		
5	B	15	B	25	D		
6	C	16	C	26	B		
7	C	17	D	27	B		
8	A	18	B	28	A		
9	D	19	C	29	A		
10	D	20	B	30	D		

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Worksheet-15

(C. Organic Chemistry)

Aldehydes and Ketones

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Q.1 **Mark the incorrect statement about aldehydes and ketones:**

A) They have higher boiling points than alkanes

B) They have lower boiling points than alcohols

C) Aldehydes are present in essential oils and ketonic group is present in camphor

D) Aldehydes have H-bonding but ketones do not have

Q.2 **All of the following statements are correct about aldehydes and ketones EXCEPT:**

A) Aldehydes are easily oxidized while ketones do not

B) Methanal gives aldol condensation reaction while ketones do not

C) Aldehydes can be oxidized easily by Fehling's solution while ketones do not

D) Aldehydes react with alcohols to form acetal while ketones do not

Q.3 **Which of the following test reactions is not shown by ketones:**

A) Grignard reagent

B) 2,4-DNPH

C) Polymerization

D) HCN

Q.4 **Which of the following test is shown be ketone only:**

A) Sod. nitroprosside test

B) Tollen's reagent

C) Fehling solution test

D) Benedict

Q.5 **All of the following organic compounds give iodoform test EXCEPT:**

A) Ethanal

B) Ethanol

C) Methyl ketone

D) Methanal

Q.6 **All of the following reagents reduce aldehydes and ketone to their respective alcohols EXCEPT:**

A) H_2/Ni

B) $LiAlH_4$

C) N_2H_2/KOH

D) $NaBH_4$

Q.7 **Which of the following aldehydes is the most reactive:**

A) Methanal

C) Butanal

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Q.8 All of the following give iodoform test EXCEPT:

A) Butanone

B) 2-Pentanone

C) 2-Hexnone

D) 3-Pentanone

Q.9 Aldehyde and ketone show which of the following mechanism of reaction:

A) Electrophilic addition reaction

B) Nucleophilic substitution reaction

C) Nucleophilic addition reaction

D) Acid base reaction

Q.10 The nucleophilic addition reactions of carbonyl group are catalyzed by bases or acids. A base catalyzed reaction:

A) Increases nucleophilic character of attacking reagent

B) Increases electrophilic character of carbon of carbonyl group

C) Increases both electrophilic and nucleophilic character

D) Has no effect on the reactivity of carbonyl groups

Q.11 Aldehydes and ketone show all of the following reactions EXCEPT:

A) Nucleophilic addition reaction

B) Reduction reaction

C) Elimination reaction

D) Oxidation reaction

Q.12 Mark the incorrect statement about Aldehydes and Ketones

A) Aldehydes on reduction with $NaBH_4$ give 1^o alcohol

B) Ketones on reduction with $NaBH_4$ gives 2^o alcohol

C) Aldehydes on reduction with N_2H_4/KOH gives alkane

D) Ketones on reduction with N_2H_4/KOH gives alkane

Q.13 Which of the following is incorrect statement:

A) 1^o alcohol on oxidation gives aldehyde

B) 2^o alcohol on oxidation gives ketone

C) On dry distillation of calcium methanotae, ethanal is produced

D) On dry distillation of calcium ethanoate, propanone is

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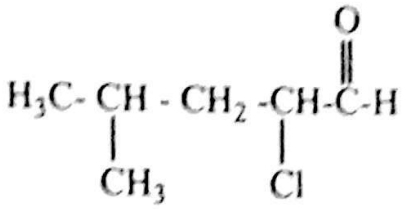
Q.14 Consider the following structure of aldehyde:



The correct name according to IUPAC is

A) 2-Chloro-4-methylpentanal

B) 2-Methyl-4-chloropentanal

C) 2-Chloro-3-methylbutanol

D) 3-methyl-2-chloropentanal

Q.15 Aldehydes can occur:

A) Anywhere in the carbon chain

B) In the middle of carbon chain

C) Only at the second carbon atom of chain

D) Only at the end carbon atom of the carbon chain

Q.16 Aldehydes acts as..... when treated with Fehling's solution:

A) Reducing agent only C) Both A and B

B) Oxidizing agent only D) Neither A nor B

Q.17 Aldehydes and ketones react with ammonia derivatives G-NH_2 to form condensation product containing the group C = N – G and water. The reaction is:

A) Base catalyzed only C) Both A and B

B) Acid catalyzed only D) Neither A nor B

Q.18 Which of the following is not easily oxidized:

A) Aldehyde C) Ketone

B) 1^o alcohol D) 2^o alcohol

Q.19 Ketones are generally resistant to oxidation. But they can be oxidized by strong oxidizing agent such as ($K_2Cr_2O_7$ + conc. H_2SO_4) on the oxidation of 2-pentanone, which of the following products are possible:

A) CH_3CH_2COOH only

B) CH_3-CH_2-COOH and CH_3COOH

C) CH_3COOH only

D) CH_3COOH and HCOOH

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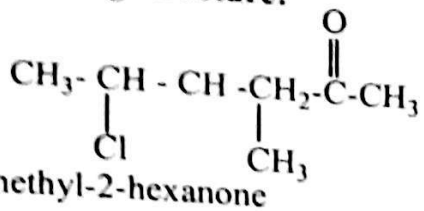
Q.20 Consider the following structure:



A) 5-chloro-3-methyl-2-hexanone

B) 2-chloro-3-methyl-5-hexanone

C) 4-methyl-5-chloro-2-hexanone

D) 3-methyl-2-chloro-2-hexanone

Topic According to NUMS Syllabus (Different From MDCAT)

Infrared spectroscopy

Q.21 The method a technique of infrared spectroscopy is conducted with an instrument called:

A) Photometer

B) Spectrophotometer

C) Polarimeter

D) Refractometer

Q.22 The infrared spectrum is divided into regains:

A) 2

B) 4

C) 3

D) 5

Q.23 Which of the following techniques is used to identify functional groups of various classes of organic compounds:

A) IR

B) UV

C) NMR

D) X-rays

Q.24 In which o the following wavelength range the C=O (carbonyl group) is identified by using IR technique:

A) 3230 – 3550

B) 2500 – 3300

C) 3100 – 3500

D) 1680 – 1750

Q.25 All of the following are applications of IR technique EXCEPT:

A) It is widely used in inorganic organic chemistry

B) It is used in forensic analysis in criminal

C) It is used to identify unsaturation in organic compounds

D) It is used in measuring the degree of polymerization in polymer manufacture

Q.26 If spectroscopy can be used to identify and study chemicals sample of the substance can be in the:

A) Solid only

B) Liquid only

C) Solid, Liquid, Gas

D) Both gas, Liquid

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ANSWER KEY (Worksheet-15)

1	D	11	C	21	B
2	B	12	D	22	C
3	C	13	C	23	A
4	A	14	A	24	D
5	D	15	D	25	C
6	C	16	A	26	C
7	A	17	B		
8	D	18	C		
9	C	19	B		
10	A	20	A		

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Worksheet-16

(C. Organic Chemistry)

Carboxylic Acid and Amino Acids

Q.1 **Which of the following is the strongest acid:**

A) CH_3COOH

B) $ClCH_2COOH$

C) $Cl_2CHCOOH$

D) Cl_3COOH

Q.2 **Which of the following acid cannot be prepared directly from carboxylic acid:**

A) Acid halide

B) Acid amide

C) Ester

D) Acid anhydride

Q.3 **All of the following methods are used to prepare carboxylic acid EXCEPT:**

A) By the oxidation of alcohol

B) By acid hydrolysis of methyl cyanide

C) By the reaction R-Mg-Br with CO_2 followed by acid hydrolysis

D) By the reduction of ethanal

Q.4 **Which one of the following methods is used to prepared acid amine:**

A) Reaction of carboxylic acid with PCl_3

B) Reaction of carboxylic acid with $SOCl_2$

C) Reaction of carboxylic acid with NH_3

D) Reaction of carboxylic acid with alcohol in the presence of conc. H_2SO_4

Q.5 **Which of the following organic acid is the most reactive and strong acid:**

A) HCOOH

B) CH_3COOH

C) CH_3CH_2COOH

D) $CH_3CH_2CH_2COOH$

Q.6 **Which of the following halosubstituted carboxylic acid is the strongest acid:**

A) FCH_2COOH

B) $ClCH_2COOH$

C) $BrCH_2COOH$

D) ICH_2COOH

Q.7 **Organic compounds X and Y react together to form organic compound (Z). What type of compounds X, Y and Z be?**

Options	X	Y	Z
A)	Acid	Ester	Alcohol
B)	Alcohol	Ester	Acid
C)	Ester	Alcohol	Acid
D)	Alcohol	Acid	Ester

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Q.8 **All of the following are optically active α-amino acids EXCEPT:**

A) Glycine
B) Aspartic acid
C) Valine
D) Alanine

Q.9 **When an alkali is added to an α-amino acids, _____releases the proton. Therefore, the acidic character is due to:**

A) $-NH_2$
B) $-NH_3^+$
C) COO
D) $COOH$

Q.10 **Which of the following is correct structural formula of lysine:**

A) $H_3C\text{-}H_2C\text{-}(CH_2)_2\text{-}CH(NH_2)\text{-}COOH$

B) $CH_3\text{-}CH(CH_3)\text{-}CH(NH_2)\text{-}COOH$

C) $H_2N\text{-}CH(CH_2)_3\text{-}CH(NH_2)\text{-}COOH$

D) $CH_3\text{-}CH(NH_2)\text{-}COOH$

Q.11 **α-amino acids are required for the synthesis of proteins. These α-amino acids are sub-classified according to how the properties of other functional group in the side chain (R-group) influence the system. Which of the following is not justified class of α-amino acid under the given conditioa:**

A) Non-polar (side chain e.g alkyl group)
B) Polar (side chain e.g amide, alcohols)
C) Acidic (side chain e.g HCl)
D) Basic (side chain e.g amine)

Q.12 **All of the following are use of ethanoic acid EXCEPT:**

A) Used as coagulant for latex in rubber industry
B) Used as a local irritant in medicine
C) Used in the manufacture of pickles
D) Used as an antiseptic in nasal infection

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Q.13 **Which one of the following compounds gives an immediate ppt with aqueous $AgNO_3$:**

A) CH_3-CH_2-CH_2-Cl
B) CH_3CCl_3
C) CH_3COCl
D) $ClCH_2COOH$

Q.14 **Which reaction does not produce benzoic acid:**

A) By hydrolysis of $C_6H_5CO_2C_2H_5$
B) By hydrolysis of C_6H_5CN
C) By oxidation of Toluene
D) By oxidation of phenol

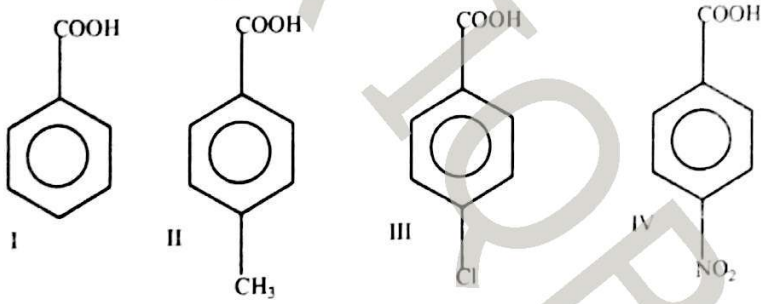
Q.15 **Which class of organic compounds is used for artificial flavorings in jams:**

A) Ester
B) Carboxylic acid
C) Ketone
D) Aldehydes

Q.16 **Which of the following compounds would react readily with NaOH:**

A) $R - NH_2$
B) $R - COCl$
C) RCOOH
D) $RCH_2 - OH$

Q.17 **In the following carboxylic acids:**



The decreasing order of acidic character is:

A) III > IV > I > II
B) II > I > III > IV
C) I > IV > III > II
D) IV > III > I > II

Q.18 **Amino acids have all of the following properties EXCEPT:**

A) They are colourless, crystalline solids
B) They have low melting points
C) They are soluble in water
D) They behave like salts rather than simple amides and carboxylic acid

Q.19 **All of the following are essential (indispensable) amino acids EXCEPT:**

A) Valine
B) Lysine
C) Alanine
D) Methonine

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Q.20 **Mark the incorrect statement about α-amino acids:**

A) They all have chiral carbon except glycine

B) They are all L-amino acids

C) 10 amino acids are called non-essential or dispensable amino acids

D) Polypeptide act as acid only

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Topic According to NUMS Syllabus (Different From UHS Syllabus)
Amines, Amides, Electrophoresis And Reactions of Carboxylic Acid Derivatives

Q.21 **The compound that react most readily with NaOH to farm methanol is:**

A) $(CH_3)_4N^+I^-$

B) $(CH_3)_3S^+I^-$

C) CH_3OCH_3

D) $(CH_3)_3C.Cl$

Q.22 **Dehydration of an amide gives:**

A) Cyanide

B) Isocyanide

C) Amine

D) Fatty acid

Q.23 **Hofmaan bromamide reaction is used to prepare _____ amine from amides:**

A) 1°

B) 3°

C) 2°

D) 1° and 2°

Q.24 **The reaction between primary amine, chloroform and few drop of alcoholic KOH to give offensive smell is known as:**

A) Cannizzeno reaction

B) Carbyl amine reaction

C) Frankland reaction

D) Wurtz reaction

Q.25 **The product D in the following sequence of reaction is:**

$$CH_3 \xrightarrow{NH_3} A \xrightarrow{Heat} B \xrightarrow{P_2O_5} C \xrightarrow{Na+C_2H_5OH}$$

A) Ester

B) Acid

C) Amines

D) Alcohol

Q.26 **The correct order of basic nature of the following:**

CH_3CH_2, $(CH_3)_2NH$, $(CH_3)_3N$ and NH_3 is:

A) $(CH_3)_2NH > CH_3NH_2 > (CH_3)_3N > NH_3$

B) $CH_3NH_2 > (CH_3)_2NH\ (CH_3)_3N > NH_3$

C) $(CH_3)_2NH > (CH_3)_3N > NH_3 > CH_3NH_2$

D) $CH_3NH_2 > (CH_3)_3N > NH_3 > (CH_3)_2NH$

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Q.27 Reaction of acetic acid with ammonia gives:

A) Acetamide
B) Acids
C) Amides
D) Aldehydes

Q.28 Which of the following compounds is expected to be strongest base:

A) Hydroxylamine
B) Methylamine
C) Aniline
D) Ethylamine

Q.29 Dehydration of ammonium carbamate gives:

A) Ethyl amine
B) Urea
C) Amino nitrile
D) All of these

Q.30 Electrophoresis is not used for the separation of

A) Nucleic acids
B) Amino acids
C) Proteins
D) Lipids

Q.31 In gel electrophoresis, how do we make the DNA migrate through the gel?

A) We place a negative electrode away from the wells
B) Large fragments drift to the end of the gel
C) We place a positive electrode away from the wells
D) Gravity

Q.32 In electrophoresis, the electrophoretic mobility ('μ') is determines the characteristics of migration of different biomolecules. Which of the following is not having any influence in 'μ':

A) Stereochemistry of molecule
B) Molecular weight
C) Size of molecule
D) Net charge of molecule

Q.33 Which of the following derivative carboxylic acid is the most reactive:

A) Acid amide
B) Acid halide
C) Ester
D) Acid anhydride

Q.34 In which of the following reaction acid chloride produces aldehyde:

A) Reaction with H_2
B) Reaction with NH_3
C) Hydrolysis
D) Reaction with Alcohol

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ANSWER KEY (Worksheet-16)

1	D	11	C	21	A	31	B
2	B	12	D	22	A	32	A
3	D	13	C	23	A	33	B
4	C	14	D	24	B	34	A
5	A	15	A	25	C		
6	A	16	C	26	A		
7	D	17	D	27	A		
8	A	18	B	28	D		
9	B	19	C	29	B		
10	C	20	D	30	D		

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Worksheet-17

(C. Organic Chemistry)

Macromolecules

Q.1 **Nylon-6,6 is a type of condensation polymerization. Its monomers are:**

A) Hexane-1,2-diaamine and hexanedioic acid

B) Hexane-1,3-diamine and pentanediotic acid

C) Hexane 1,2-diamine and butnanedioic acid

D) Pentane -1,2-diamine and butanedioic acid

Q.2 **Which of the following intermolecular force is dominant in Nylon-6,6 :**

A) Dipole dipole forces

B) Hydrogen bonding

C) Debye forces

D) London dispersion forces

Q.3 **Nylone-6,6 has call of the followings properties / uses EXCEPT:**

A) It is a textile fibre

B) It has high strength

C) It has abrasion resistance

D) It has very low elasticity

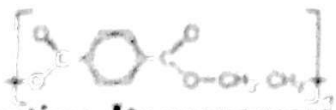
Q.4 **There are two types of polymerization i.e. addition and condensation. Condensation polymerization has all of the following properties:**

A) It involves two different monomers

B) It take place with the elimination of small molecules

C) It involves catalyst

D) It molar mass is not fixed

Q.5 **Polyester**  **is a type of condensation polymerization. Its monomers are:**

A) 1,2-Ethanediol and 1,4-benzene dicarboxylic acid

B) 1,3-profanediol and 1,2-benzene dicarboxylic acid

C) 1,1-Ethanediol and 1,3-benzene dicarboxylic acid

D) 1,4-Butanediol and benzoic acid

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Q.6 **Polyester is also known as perylene or Darcon. Identify the incorrect statement about the uses of polyester:**

A) It is used as summer suiting by blending with cotton

B) It is used as winter suiting by blending with cotton

C) It is used to make bristles for brushes

D) It is used to make seat belts

Q.7 **Polymers can be classified on the basis of thermal properties i.e thermoplastic polymers and thermosetting polymers.**

Thermosetting polymers show all of the following properties EXCEPT:

A) They are formed by condensation polymerization

B) They do not involve chemical change on heating

C) They de compose on heating

D) They do not melt on heating

Q.8 **Mark the incorrect statement about thermoplastic polymers:**

A) They are formed by addition polymerization

B) They melt on heating and harden again on cooling

C) The are more brittle and insoluble in organic solvents

D) They can be remoulded, recast and reshaped

Q.9 **All of the following are thermosetting polymers EXCEPT:**

A) Polystyrene

B) Bakelite

C) Synthetic varnish

D) Terylene

Q.10 **All of the following are thermoplastic polymers EXCEPT:**

A) PVC

B) Teflon

C) High density polyethylene (HDPE)

D) Nylon-6,6

Q.11 **Which of the following is a synthetic polymer:**

A) Animal fat

B) Starch

C) Polyester

D) Cellulose

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Q.12 Plastics are pollution problem because many plastics:

A) Are made from petroleum

B) Are very in flammable

C) Burn to produce toxic fumes

D) De compose to produce products

Q.13 A polymeric substance that is formed in the liquid state and then harden to a rigid solid is called a:

A) Animal fibre

B) Mineral fibre

C) Plastic

D) Polyamide resin

Q.14 PVC is an addition polymer obtained by polymerizing vinylchloride at 25 °C and 9.0 atmospheric pressure.

All of the following are uses of PVC EXCEPT:

A) It is used for floor coverings

B) It is used in pipe making

C) It is used in making gramophone recorders

D) It is used for making toys

Q.15 Polystyrene is an addition polymer obtained by polymerization styrene in the presence of catalyst. which of the following is not use of it:

A) It is used as an adhesive material

B) It is used for making cosmetic bottles

C) It is used for making packing material

D) It is used for making food containers

Q.16 Mark the pair of macromolecules which have same type of linkage:

A) Proteins and nylon

B) Protein and PVC

C) Nylon and polyethylene

D) PVC and Bakelite

Q.17 Which of the following polymer is formed through free radical mechanism:

A) Nylon-6, 6

B) Polyester

C) PVC

D) Bakelite

Q.18 Which of the following is not nitrogen base:

A) Adenine

B) Casein

C) Guanine

D) Thymine

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Q.19 All of the following have peptide linkage EXCEPT:

A) Nylon-6, 6
B) Terylene
C) Protein
D) Nylon-6, 10

Q.20 Mark the incorrect statement about deoxyribonucleic acid (DNA):

A) It is hereditary material
B) It is double stranded molecule
C) It is present in the nucleus and cytoplasm of a cell
D) It has the property of self-replication

Q.21 All of the following are addition polymers EXCEPT:

A) Polyvinyl chloride
B) Polyethylene
C) Polyvinyl acetate
D) Polyester

Q.22 Which of the following is not correctly matched:

A) Nylon 6,6 ---- hexanedioic acid and hexamethylene diamine
B) Polyester ----- Terephthalic acid and ethylene glycol
C) Polyacrylonitrile ----- acrylic acid
D) Bakelite ----- phenol and formaldehyde

Q.23 The sequence of the amino acids combined in a peptide chain is referred to as the:

A) Primary structure
B) Secondary structure
C) Tertiary structure
D) Quatenary structure

Q.24 The _____ structure of a protein is a regular coiling or zigzagging of polypeptide chains caused by hydrogen bonding between NH and C=O groups of amino acids near each other in the chains.

A) Primary structure
B) Secondary structure
C) Tertiary structure
D) Quatenary structure

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ANSWER KEY (Worksheet-17)

1	A	11	C	21	D
2	B	12	C	22	C
3	D	13	C	23	A
4	C	14	D	24	B
5	A	15	A		
6	C	16	A		
7	B	17	C		
8	C	18	B		
9	A	19	B		
10	D	20	C		

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Worksheet-18

(C. Organic Chemistry)

Environmental Chemistry

Q.1 Mark the incorrect statement:

A) The gases in the atmosphere absorb only cosmic rays

B) Oxygen (O_2) gas in the atmosphere is essential for sustaining life on earth

C) Carbon dioxide (CO_2) gas is required for plant photosynthesis

D) Nitrogen (N_2) gas is used for nitrogen fixing bacteria

Q.2 The harmful substances pollute the atmosphere. They damage which of the following:

I. Damage the environment II. Human health

III. Quality of life

A) I, II Only

B) II, III Only

C) I, III Only

D) I, II, III

Q.3 Which of the following is not primary pollutant:

A) SO_2

B) NH_3

C) O_3

D) CO

Q.4 Sulphur dioxide (SO_2) is the most culprit pollutant in the atmosphere. The percentage of SO_2 produced by volcanoes eruption is:

A) 67%

B) 65%

C) 63%

D) 62%

Q.5 Large quantities of hydrocarbons are emitted by different trees and plants in the atmosphere. Which of the following hydrocarbon is produced by paddy fields:

A) Methane

B) Ethane

C) Ethene

D) Ethyne

Q.6 The residence time of NO and NO_2 in the atmosphere are _____ and _____ are respectively:

A) 2 and 1 days only

B) 3 and 2 days only

C) 4 and 3 days only

D) 5 and 4 days only

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Q.7 **SO_2 and SO_3 have which of the following harmful effects:**

I. Are irritating

II. Are suffocating

III. Form sulphate aerosols which cause respiratory troubles

IV. Are major source of acid deposition

A) I, II
C) I, II, III
B) II, III, IV
D) I, II, III, IV

Q.8 **Methane has a mean residence time of about _____ in the atmosphere:**

A) 2 – 4 Years
C) 3 7 Years
B) 3 – 5 Years
D) 2 6 Years

Q.9 **Which of the following are the major source of hydrocarbons emission:**

A) Petroleum
C) Automobiles
B) Coal
D) Wood

Q.10 **The pH of unpolluted water should be:**

A) 5.0
C) 5.4
B) 5.6
D) 5.2

Q.11 **The acid deposition involves:**

A) Wet acidic deposition (rain, fog and snow) only

B) Dry acid deposition only

C) Both A and B

D) Neither A nor B

Q.12 **All of the following statements about ozone (O_3) layer are correct EXCEPT:**

A) It depletes every year during Sept-Oct

B) It ranges from 25-28 high in stratosphere

C) Its normal amount is 350DU

D) It is an allotropic form of oxygen

Q.13 **The stratosphere where the ozone exists is approximately at:**

A) 10 – 30km altitudes
C) 20 – 50km altitudes
B) 15 – 40km altitudes
D) 25 – 60km altitudes

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Q.14 Ozone is produced in most of the tropical regions, from where it is transported to polar region. When the concentration of ozone (O_3) exceeds 100 ppm in the polar region, it causes all of the following health problems EXCEPT:

A) It damages eyes

B) It decreases the elasticity of lung tissues

C) It acts as reducing agent and causes fabric dyes to fade

D) It aggravates asthma

Q.15 Ozone is produced in most of the tropical regions by the process of:

A) Oxidation

B) Reduction

C) Redox reaction

D) Photochemical reaction

Q.16 The amount of ozone in atmosphere is expressed in Dobson units (DU). The normal amount of overhead ozone is about _____ in stratosphere:

A) 330DU

B) 340DU

C) 350DU

D) 360DU

Q.17 The region in which ozone depletes substantially in every year during _____ is now termed as ozone hole.

A) Sept - Nov

B) Oct - Dec

C) Sept - Oct

D) Aug - Nov

Q.18 A single chloride free radical can destroy how many ozone molecules:

A) 100

B) 10000

C) 100000

D) 10

Q.19 Acidification of the soil can:

A) Can leach nutrients

B) Can increase pH of the soil

C) Can damage building material

D) Can damage growth of forest

Q.20 Temporary acid rain in some countries is due to release of _____ by volcano eruption:

A) HCl

B) H_2CO_3

C) H_2SO_4

D) HNO_3

UMER GLOBAL

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Q.21 **A single chloride free radical can destroy the number of ozone molecules:**

A) 100
B) 1000
C) 10000
D) 100000

Q.22 **Peeling of ozone layer is due to:**

A) CO_2
B) CFCs
C) PAN
D) Coal burning

Topic According to NUMS Syllabus (Different From UHS Syllabus)
Greenhouse Effect and Global Warming, Water Pollution and Water Treatment

Q.23 **Heavy metals (Pt, Cd, As and Hg) are highly toxic and do not have any safe limits. When ingested through food or water and cause all of the following health problems EXCEPT:**

A) Kidney diseases
B) Diabetes mellitus
C) Neutrons disorder
D) High blood pressure

Q.24 **Leather tanneries are the big source of chromium pollution in the environment. Which of the following oxidation state chromium (Cr) is highly toxic and is known to cause cancer:**

A) Cr (II)
B) Cr (III)
C) Cr (VI)
D) Cr (IV)

Q.25 **Chemical and bacterial contents in livestock waste can contaminate surface and ground waters and cause all of the following diseases EXCEPT:**

A) Dysentery
B) Typhoid
C) Hepatitis
D) Malaria

Q.26 **Sea water gets polluted by accidental oil spills. Many petroleum products are poisonous and pose serious health problems to humans animals and aquatic life. Which of the following petroleum products are known to be carcinogenic even at low concentration.**

A) Polycyclic aromatics
B) Monocyclic aromatics
C) Alicyclic
D) Heterocyclic aromatics

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Q.27 Soaps and detergents are excessively used in industries and household as cleaving agents which of the following is the most dangerous pollutant:

A) Soap only
B) Detergents only
C) Both A and B
D) Neither A nor B

Q.28 Which of the following methods is used to remove permanent hardness of water:

A) Aeration
B) Coagulation
C) Ion exchange method
D) Chlorination

Q.29 The materials which are suspended or present in the colloidal form are removed by coagulation. The coagulant hydroxides from potash alum is precipitated and suspended particles are gets absorbed over it settle at the bottom. Which of the following is that coagulant?

A) KOH
B) $Fe(OH)_3$
C) $Al(OH)_3$
D) $Cu(OH)_2$

Q.30 The quality of raw water is improved by aeration. Aeration of water serves all of the following functions EXCEPT:

A) It is used to remove the dissolved gases
B) It oxidizes Fe^{+2} to Fe^{+3}
C) It improves the oxygen level of raw water
D) It reduces organic matter with air

Q.31 Pesticides have been used for the eradication of following diseases EXCEPT:

A) Malaria
B) Sleeping sickness
C) Tuberculosis
D) Yellow fever

Q.32 Water is considered as pollutant water if it contain dissolved oxygen:

A) 3ppm
B) 5ppm
C) 6ppm
D) 8ppm

Q.33 All of the following are harmful effect of chlorination of water EXCEPT:

A) It produces chloramines
B) It form some organic compound which are toxic
C) It forms $CHCl_3$ when HOCl reacts with humic acid
D) It is used to disinfect water

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Q.34 To avoid the formation of toxic compounds with chlorine which substance is used for disinfection of water:

A) $KMnO_4$

B) Chloroamine

C) Alum

D) O_3

Q.35 The term greenhouse effect was first of all used by Nils Gustaf Ekholm in 1901. All of the following gases from a thick cover around the earth and it does not allow infra red rays emitted by earth to escape EXCEPT:

A) CO_2

B) O_3

C) CH_4

D) CO

Q.36 Green chemistry refers to:

A) Chemistry of plants

B) Development of chemical product and process is less harmful to humans

C) Chemistry of green pigments

D) Chemistry of greenhouse effect

Q.37 Global warming is expected to be greatest in the:

A) Land

B) Oceans

C) Arctic

D) Antarctic

Q.38 Global warming and climate changes are terms used for the observed century-scale rise in the average temperature of the earths climate system. Global means surface temperature change from 1880 to 2016. An increase in average global temperature results in the following incidence of infectious diseases EXCEPT:

A) Malaria

B) Sleeping sickness

C) Dengue, yellow fever

D) Asthma

Q.39 The lowest region of the atmosphere, extending from the earth's surface to a height of about 6–10 km (the lower boundary of the stratosphere) is called:

A) Troposphere

B) Stratosphere

C) Mesosphere

D) Thermosphere

UMER TOBAT

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ANSWER KEY (Worksheet-18)

1	A	11	C	21	D	31	C
2	D	12	A	22	B	32	A
3	C	13	B	23	B	33	D
4	A	14	C	24	C	34	D
5	A	15	D	25	C	35	D
6	C	16	C	26	A	36	B
7	D	17	A	27	B	37	C
8	C	18	C	28	C	38	D
9	C	19	B	29	C	39	A

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